



FRIDAY, OCTOBER 23, 1896.

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Contributions.

Some of the Effects of the Storm of Sept. 29.

Norfolk & Western Railway Co.,
ROANOKE, VA., Oct. 12, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice some geographical and other errors in your article of Oct. 9 as to the effects of the hurricane on Sept. 29.

Our bridge at Riverton, Va., over the Shenandoah River (not the Susquehanna as you state) was not damaged in any way by the high water of the Shenandoah. The bridge of the Southern Railway, however (within a few hundred feet of our bridge) did have two approaches entirely carried away.

We did not experience any serious damage in Maryland; but in Virginia, between Front Royal on the North and Buena Vista on the South, we had a number of wash-outs, as the hurricane of the 29th ult. was central on the evening of the 29th over this portion of our road in the vicinity of Basic; and the State Weather Service shows a fall of nearly seven inches of rain in a few hours.

As a consequence of this hurricane we had a number of wash-outs of embankments from 5 to 35 ft. in height that have stood for many years, and also a number of bridges over lateral streams running from the Blue Ridge Mountains to the Shenandoah River.

All the above damages were promptly repaired and traffic resumed at the earliest possible date.

The Tests of Car Wheels.

A. Whitney & Sons,
PHILADELPHIA, PA., Oct. 14, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We have directed considerable attention to avoid that character of casting, which, though often quite strong, will not stand brakes properly. We now have much chemical and physical data derived from various wheels and test bars, indicating the best chemical compositions of cast iron to withstand heating with little sacrifice of chill or strength.

As you surmise, the adoption of tests for this quality in addition to the present specifications would tend to raise the price of wheels. Probably some extra expense would be required for annealing, particularly by those who trust to the heat of wheels only, enclosed in pits, and use no additional fire. But the most important point by far is the exact regulation of chemical composition of iron mixture and of the foundry conditions throughout the heat. By such regulation it is not difficult to keep the strength far above the requirements of the drop test even with very high chill. Without such careful regulation, the strength and chill of wheels which would pass such a severe heat test as proposed would usually be at lowest limit of specifications and the price as discouraging to the buyer as the cost to the maker. We have no doubt that the required quality can be regularly made without material sacrifice of chill or strength, and it is likely that less expensive tests may eventually be found equivalent to the drop test and proposed heat test.

Our experience with the application of chemistry to all our hard and soft mixtures here, particularly since January, 1892, has conclusively proved that by the close daily control of the chemical compositions of the cupola charges (by a principle discovered and applied here by the writer) in connection with the daily physical test blocks and bars cast under standard conditions at stated intervals during the melt, it is entirely practicable to work

with economy to closer specifications than formerly by the old method of guessing by fracture and physical tests of the constituent irons of a mixture. The records and tabulations of our various wheel and other mixtures thus controlled by close figuring are remarkable for the regularity of high quality in strength, resilience and contraction as shown by wheels and test bars of gray and of chilled (solid white) iron, a large number of which are tabulated by chemical composition also. Further study of the limitations imposed on these compositions by a severe heat test will regularly assure the required addition to the high qualities now attained.

A. WHITNEY & SONS,
by Asa W. Whitney.

The Elevation of Rails on Curves.

RICHMOND, Va., Oct. 13, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I agree with the Chief Engineer of the Erie Railroad Company as to the practice recommended by the committee of the Roadmasters' Association. (See *Railroad Gazette* of Sept. 11.) The formula given in that report may be termed venerable. The principles on which it is based are probably correct. For standard gage and velocity in miles per hour, it is more conveniently stated:

$$0.313 \frac{V^2}{R}$$

It is convenient to remember that, for standard gage and a speed of 39 miles an hour, the cant obtained by that formula for a 1 deg. curve may be taken as 1 in.; and, as the cant varies as the square of the velocity, it doubles for 59 and trebles for 68 miles an hour. So a 10 deg. curve and a speed of 39 miles per hour require 10 in., a proof, I think, of the wisdom of prescribing limits to the cant.

E. T. D. MYERS.

New York, New Haven & Hartford Railroad Co.,
BOSTON, Oct. 16, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

That it is customary for enginemen to reduce speed on curves as suggested by Prof. C. Frank Allen in your issue of Sept. 11 is, I think, not true generally, at least in this section of the country, and recent experience while a passenger on an important trunk line outside of New England convinced the writer, as it doubtless did a gentleman sitting opposite him in the dining car, and who was thrown from his seat to the floor, that the practice did not obtain on that road. Enginemen do not, nor would they be allowed to, reduce speed except while passing curves not common on main lines where fast trains are operated.

The conditions which must determine the elevation to be given to the outer rail on curves are so numerous and variable that any rule or table, to be practicable, must be sufficiently elastic to meet these conditions. It seems to me that this requirement is well met by the table recommended by the Roadmasters' Association.

If, on our double track, we were to give the up-grade track the same elevation found necessary on the down grade, where trains habitually run from 60 to 70 miles an hour, the result would be unnecessary wear of track and wheels, waste of power, and uncomfortable "sagging" of passenger coaches. On single or double track roads, with mixed traffic of varying speed, the most that can be hoped for is to strike a happy medium; in other words, we cannot have our track right for all speeds. It follows, then, that we should decide upon some one rate of speed for which it shall be right; this done, the Roadmasters' table enables us to easily determine the proper elevation.

C. A. MCALPINE, Superintendent.

PITTSBURGH, Pa., Oct. 12.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The subject of elevation on sharp and flat curves is treated quite comprehensively by Supt. D. H. Lovell, of the Pennsylvania Railroad, in his little book entitled "Practical Switch Work." Table No. 36, on page 155, in which elevation for different speeds in miles per hour, is given, shows relatively lower elevations for sharp than for light curves, and the reasons therefor are given in the context, substantially as some of your correspondents, and also the track foreman quoted by Professor Allen, have given them.

It is, I think, quite true that enginemen of experience and judgment customarily reduce their speed to a perceptible extent by the application of air when approaching or rounding sharp curves, while it would not occur to them that light curvature calls for any reduction of speed whatever.

In former times, owing to the slow release of the old straight air, enginemen were almost as unwilling to apply air in rounding a curve as to close the throttle; but nowadays when the air answers so quickly to the engineer's touch, it is an easy and natural expedient, commending itself to any runner of judgment, to make one, two or more applications and releases of air in going around a sharp curve.

Baltimore & Ohio Railroad,
BALTIMORE, MD., Oct. 2, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I concur very much in the opinion expressed by Mr. Allen; in fact his theoretical construction of the elevation of the outer rail is a very sensible one. Engineers do make their fastest time on tangents and the lighter curves; therefore, the schedule rate of speed is not adhered to but an increased speed used, requiring a greater

elevation for the lighter curves than would be deduced from a regular table of curvature. For instance, on our Philadelphia Division we have a three degree curve at the foot of a grade which has an elevation of $\frac{3}{4}$ in. It would be totally impracticable to apply this to an 8-deg. curve; therefore, Mr. Allen's views in regard to this subject are, in my opinion, very reasonable.

The above-cited curve is not the only one that I could bring to your notice, as in many cases we use a far greater ratio for elevation for lighter curves than we do for the heavier ones.

W. T. MANNING, Chief Engineer.

The Journey of Prince Hilkoﬀ.

The journey of Prince Hilkoﬀ, Minister of Transportation of the Russian Empire, gives one an impression of the energy and hardihood of the Russians. Few men of 60 would care to undertake to go around the world in 85 days. Prince Hilkoﬀ left St. Petersburg on Aug. 10, and crossed Siberia, the total journey to Vladivostok being 6,450 miles. Of this 4,990 miles could be made by rail. Then he crossed the Pacific in a Russian warship, a very uncomfortable craft for a long voyage, and arrived in San Francisco about the 7th of this month. At San Francisco he was taken in hand by the officers of the Southern Pacific and came rapidly to Philadelphia by rail over the Southern Pacific, the Rio Grande Western, the Denver & Rio Grande, the Atchison, Topeka & Santa Fe, the Pennsylvania Lines and the Pennsylvania Railroad. He has been able to stop only for a very short time at any one place. He has, however, seen something of the most important of the railroad centers—important either in a traffic way or from a mechanical standpoint. In Philadelphia he was entertained at dinner by Mr. Frank Thomson and by Mr. Conversa, and visited the Baldwin Locomotive Works and the Allison Works. He also made a trip to the works of Harlan & Hollingsworth, at Wilmington.

Early Sunday morning he arrived in New York and at eight o'clock that morning left for Niagara Falls by the New York Central. That company had provided a special train of three cars which took Prince Hilkoﬀ and his small suite to Niagara Falls, where they spent the night and Monday morning. Later in the day the party went to Buffalo and saw something of the Wagner shops, of Depew and of the great coal terminals. Tuesday morning the party reached New York again, where the day was spent. Tuesday evening the Prince was entertained at dinner and a reception at the Metropolitan Club and on Wednesday sailed in the Paris.

The party consists of Prince Michael Hilkoﬀ, his son, Prince Michaelovitch Hilkoﬀ, a young engineer; Lieutenant Tebertkoff, of the Imperial Guards, and Mr. Bolchakoff, Private Secretary. With this small party Prince Hilkoﬀ travels in a very simple, unostentatious way, and, as Americans would say, he obviously means business. The officers of the New York Central who accompanied him on the trip to Niagara Falls and back were Mr. Van Etten, General Superintendent; Mr. Katté, Chief Engineer; Mr. Daniels, General Passenger Agent, and Mr. Harrington, Division Superintendent (part of the way). Mr. G. Creighton Webb was also with the party as the representative of Mr. Depew, who was unable to return to New York for this occasion. Of course, any mention of Prince Hilkoﬀ's journey would be incomplete without the name of Major J. G. Pangborn, who, with his Secretary, came from St. Petersburg to San Francisco to meet the Prince, has accompanied him across the Continent and sailed with him for Russia. He, more than any other man, has organized the whole expedition in the United States.

As Prince Hilkoﬀ has been somewhat identified with American railroads, and as he is at the head of the whole transportation system of a great empire, our readers may be interested to know, with some particularity, what he is like personally. He is a solid man, square-shouldered, probably about 5 ft. 9 in. high. He is erect and strong and active in his movements. His hair and the little tuft on his chin are almost white, but he is probably not more than 60 years old. His complexion is fresh, and his keen, bright blue eyes are very lively and energetic. He is a man of great courtesy of manner, and at the same time perfectly simple and natural. He is as keenly interested in what he sees about him as Li Hung Chang was, but his questions never degenerate into merely personal curiosity. His whole conversation suggests an accurate, well-stored and tenacious mind and great practical sense. He speaks with extraordinary frankness for a man in official position, and the opinions which he expresses of eminent men and their policies would make very interesting reading if one could feel at liberty to publish them.

We give elsewhere in this issue a pretty circumstantial account of the Siberian Railroad. The length of line now completed, as given in that article, is from Prince Hilkoﬀ's statements to the writer. With regard to the line across Northern Manchuria he could not speak (or, at least, did not) very definitely, but so far as the writer could learn it is still a question whether the Russians will build through Manchuria or down the Amoor. Of course they cannot build through Manchuria as a government, but that portion of the line must be done by a private company. Engineers to survey the line have been "loaned" to private parties by the Russian Government. Indeed it is possible that a line from the south end of Lake Baikal, or somewhere in that region, will be run southeasterly through Mongolia and get to tide-water at a point a good deal further south than Vlad-

vostock. This would make the line immensely more useful for general commercial purposes, but nobody can tell whether or not the Chinese would permit it. At present this is a matter of pure speculation with the probabilities against the building of such a line.

Prince Hilkoﬀ said that studies have been made for about 2,000 miles of new railroad in European Russia, a part of which is actually under construction. One of

loads of pine have recently been sent from Archangel to Australia. Archangel has also valuable fisheries.

Some Examples of Metal Underframes from Foreign Countries.

In the *Railroad Gazette* of June 12 and July 17, there were illustrated a number of cars showing the latest de-

the frame, usually to the side sills. Because of this and of the arrangement of the buffing gear, buffers being placed near the extremities of the end sills, the side sills are of much greater relative importance than in American cars.

The underframes in use on the Paris & Orleans Railroad are shown in Figs. 1 to 5. Fig. 1 is the frame for a first-class vestibuled coach seating 27 persons. The construction of this car is different from that of others shown, in that the underframe is not separate but constitutes the lower part of the car. The frame is 37 ft. long over end sills and 14 ft. 6 in. over platform sills. The side sills are steel channels 6.3 in. x 2.4 in. x .23 in. placed with flanges in and spaced 10 ft. 2 in. from outside to outside. The end sills are channels of the same dimensions, while the platform sills which carry the buffers, spaced 68 in. between centers are deeper, being 9.8 in. x 3.2 in. x .4 in. channels. The other transverse members of the frame consist of four I-beams 6.3 in. x 3.5 in. x .26 in., and four channels of the same section as the side and end sills. The I-beams are near the ends on either side of each axle, while the cross channels are in the middle of the car.

Extending between the platform sills are two lines of I-beams 6.3 in. deep, spaced 6 ft. 4 in. between centers of webs. These beams constitute the principal strength of the frame, as they must take the shocks of collision, and to them are fastened the pedestals. On the under side of the cross beams are two angles 3.15 in. x 2.4 in. x .28 in. spaced 6 in. on either side of the center line of the car and continuous between platform sills. At the ends these angles are reinforced by plates 66 in. long and .28 in. thick riveted to the vertical flange, thus affording additional support to the platforms.

The joints between I-beams and channels are made with connection angles and at the corners and principal intermediate joints cover plates are also used. The longitudinal angles are secured to the cross-beams by brackets. Rivets .59 in. in diameter are used throughout. The drawbar extends from end to end of the car and is attached to the frame between two of the intermediate cross channels.

The side of the car body below the windows consists of a .15-in. steel plate riveted to the side sill. At the top this plate is reinforced by a small channel and a steel molding, the latter being on the exterior of the car.

This construction was first adopted for large cars with trucks. One of these exhibited at the Paris Exposition

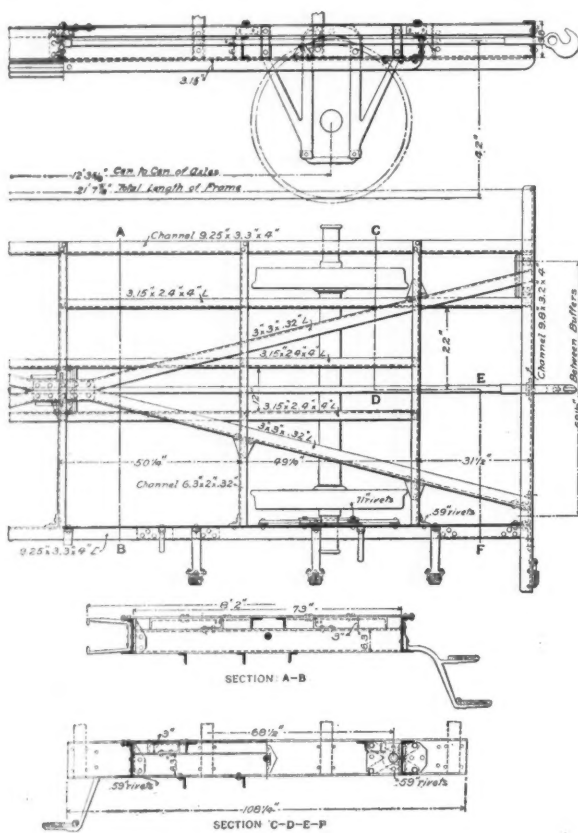


Fig. 3.—Baggage Car—Paris & Orleans Railroad.

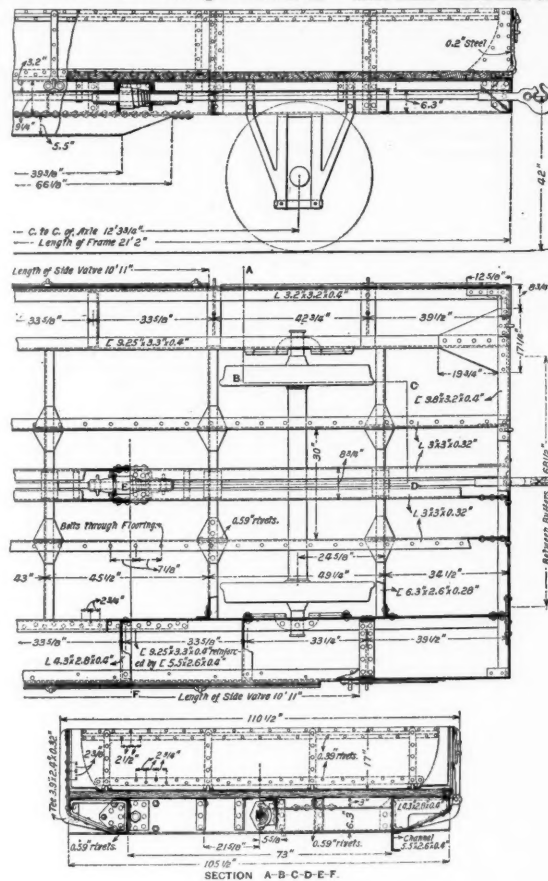


Fig. 4.—Gondola Car—Paris & Orleans Railroad.

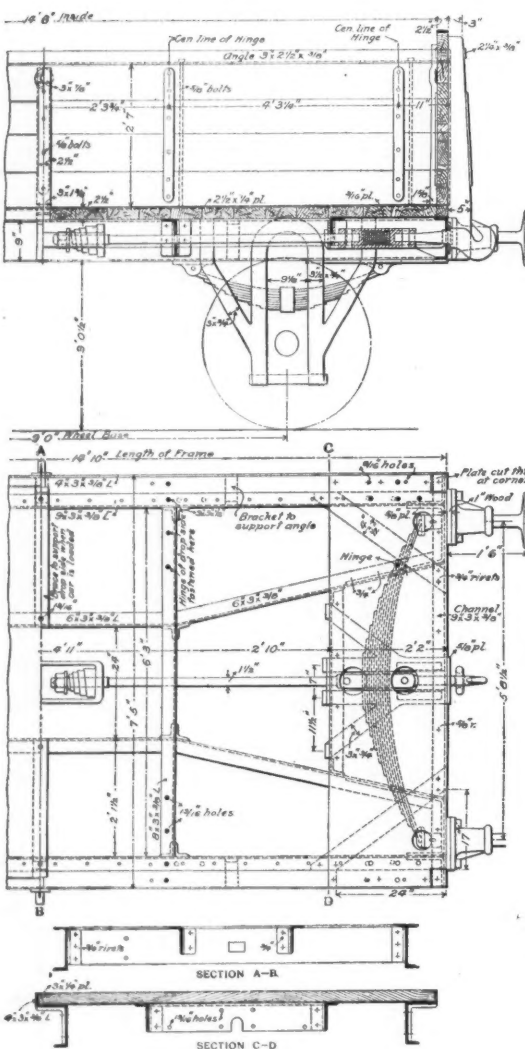


Fig. 8.—Nine-Ton Mineral Wagon—Built by Hurst, Nelson & Co.

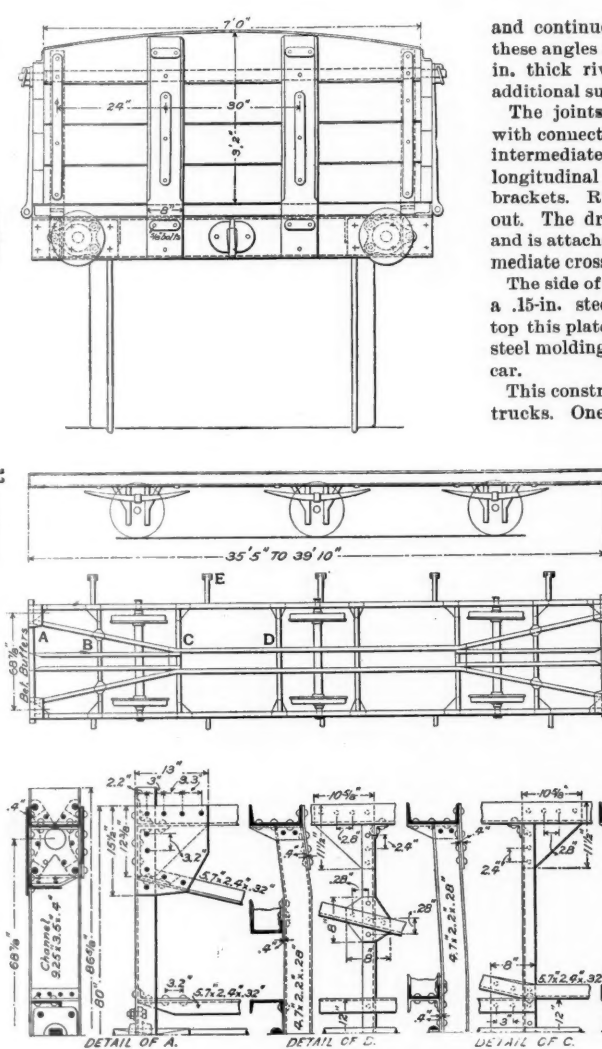


Fig. 9.—Passenger Cars—Prussian State Railroads.

these lines, a singularly interesting one, we have mentioned before (p. 26, vol. of 1896). It is the line from Vologda, directly north, about 400 miles to Archangel, on the White Sea. Much of this line is through a wilderness, but it opens up valuable timber. Two ship-

velopment in steel underframes in the United States. Metal is used almost universally in Europe, and the designs shown in this issue illustrate European practice. In these cars the car body is not carried on trucks, and the pedestals are fastened to longitudinal members of

in 1889 was a first-class vestibuled coach with a longitudinal aisle and seven compartments seating altogether 42 persons. The car was 63 ft. 8 in. long over platforms and carried on two four-wheel trucks placed 35 ft. 2 in. between centers. The end and platform sills were 9.8

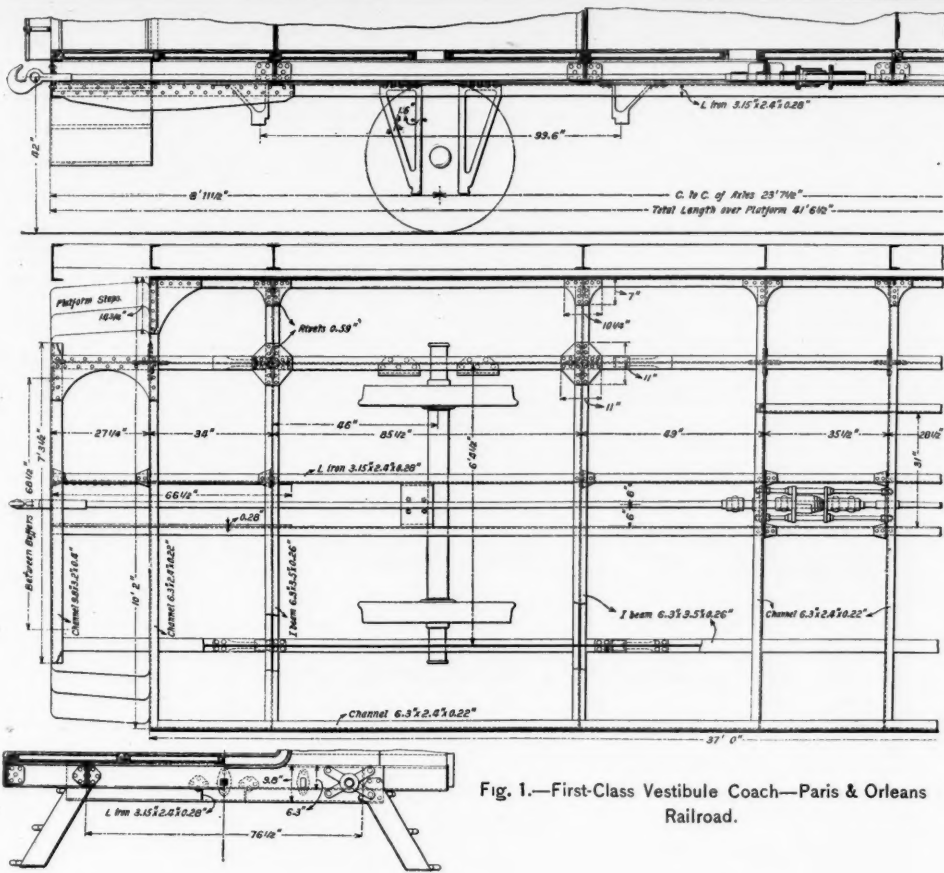


Fig. 1.—First-Class Vestibule Coach—Paris & Orleans Railroad.

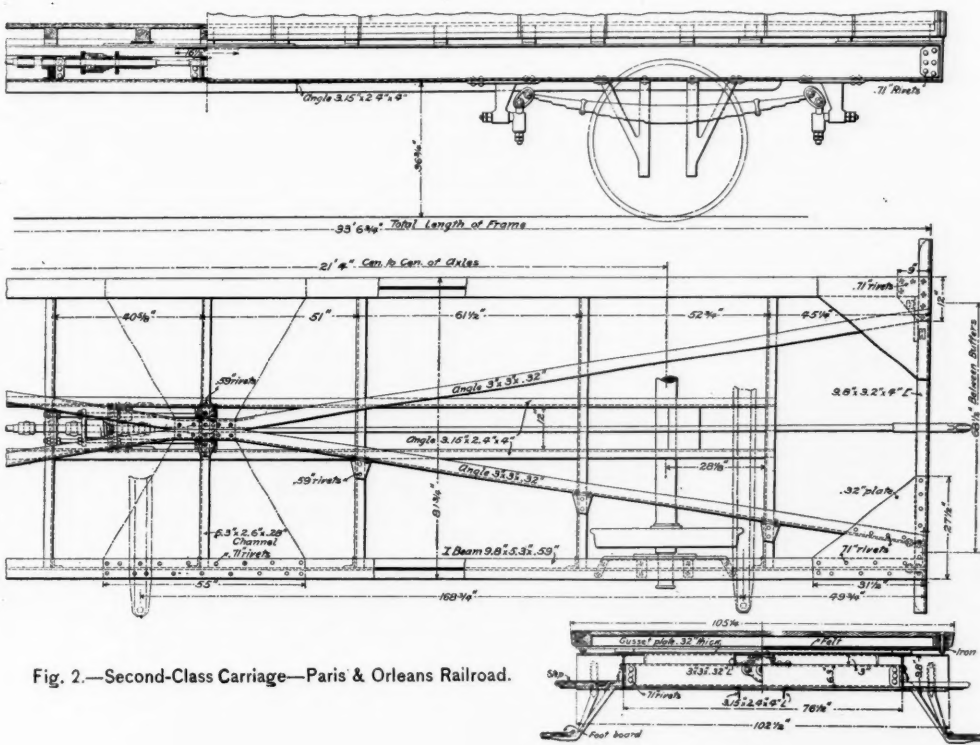


Fig. 2.—Second-Class Carriage—Paris & Orleans Railroad.

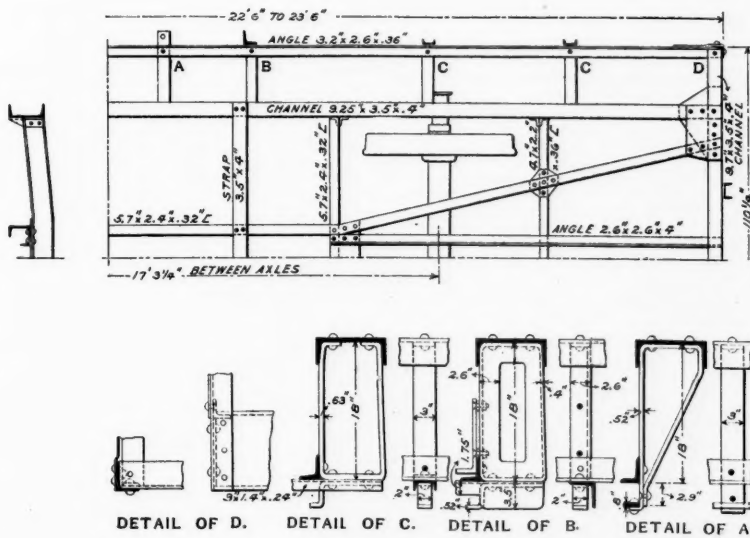


Fig. 10.—Frame of 33,000-lb. Freight Car—Prussian State Railroads.

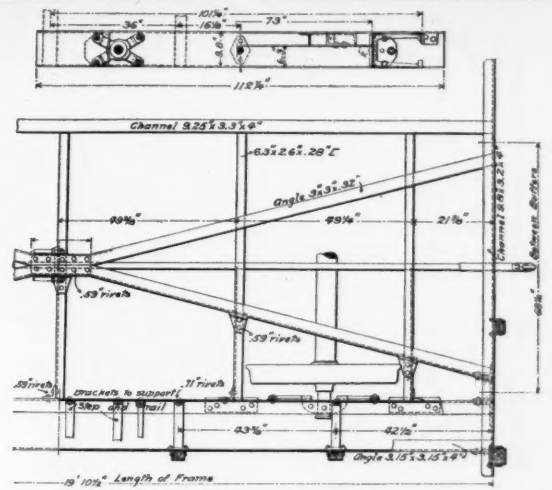


Fig. 5.—Covered Goods Wagon—Paris & Orleans Railroad.

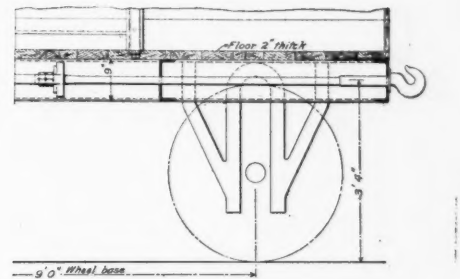


Fig. 6.—Open Goods Wagon—Built by Hurst, Nelson & Co.

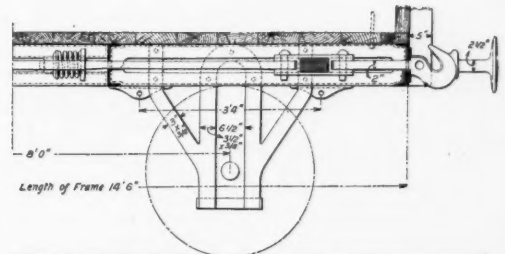


Fig. 7.—Nine-Ton Mineral Wagon—Built by Hurst, Nelson & Co.

in. \times 3.2 in. \times 4 in. channels, and the side sills and intermediate cross pieces 6.9 in. \times 2.4 in. \times .32 in. channels. The center bearings were attached to box girder transoms consisting of two channels of same section 6.9 in. \times 2.4 in. \times .32 in. with cover plates top and bottom. Otherwise the general design of the frame was similar to that shown in Fig. 1.

The second and third class carriages used on this road are divided into compartments and have the underframe separate from the car body. Fig. 2 shows the frame of a second-class carriage seating 60 persons. The frame of the third-class carriage differs from this only in being 2 ft. 4 in. longer. There are no platforms, and the bumpers, spaced 68 $\frac{1}{2}$ in. apart, are carried on the end sills, which are channels, 9.8 in. \times 3.2 in. \times .4 in. and 102 $\frac{1}{2}$ in. long. The frame is 33 ft. 6 $\frac{1}{2}$ in. long, I-beams 9.8 in. \times 5.3 in. \times .59 in., spaced 76 $\frac{1}{2}$ in. between centers of webs form the side sills, and seven channels 6.3 in. \times 2.6 in. \times .28 in. serve as cross-ties. The latter are placed with the bottom flange flush with the bottom flanges of the side sills.

On the tops of the cross channels and secured to them by brackets are two angles, 3 in. \times 3 in. \times .32 in., forming a St. Andrew's cross, and extending the entire length of the frame; these constitute the diagonal braces. Two angles, 3.15 in. \times 2.4 in. \times .4 in., 26 ft. long, are placed on, 12 in. apart, and riveted to the lower flanges of the cross channels, affording additional longitudinal bracing.

Joints between channels and I beams are made with connection angles, rivets .71 in. in diameter being used. For securing the angles to the transverse channels .50 in. rivets are used. At the corners of the frame are cover plates .32 in. thick, the top ones measuring 27 $\frac{1}{2}$ in. \times 49 $\frac{1}{2}$ in. and the bottom ones 9 in. \times 12 in. At the center of the frame it is further braced by plates riveted to the upper flanges of the side sills and to the diagonal braces.

The frame of a baggage car is shown in Fig. 3. The side sills are channels 9.25 in. \times 3.3 in. \times .4 in., and the cross ties are channels 6.3 in. \times 2 in. \times .32 in. The length of the frame is 35 ft. 10 $\frac{1}{2}$ in. and the length of the end sills 108 $\frac{1}{2}$ in. Otherwise the design is similar to Fig. 2, except that the cover plates at corners and center are omitted. Rivets .50 in. in diameter are used throughout for the joints of the frame.

Fig. 4 illustrates a gondola car. It is entirely of steel, except the flooring, and has drop ends and drop sides, the side valves being 10 ft. 11 in. long, and in the middle of the side of the car. The car is 21 ft. 2 in. over end sills, has two axles spaced 12 ft. 3 $\frac{1}{2}$ in. between centers and is designed to carry a load of 22,000 lbs., concentrated at the center or uniformly distributed.

The side sills are channels, 9.25 in. \times 3.3 in. \times .4 in., spaced 73 in. between webs, and the cross-ties are five channels, 6.3 in. \times 2.6 in. \times .28 in., placed with lower flanges flush with the lower flanges of the side sills. Extending the entire length of the car and serving, together with the side sills, to support the wooden flooring, are four 3 in. \times 3 in. \times .32 in. angles secured to the cross-ties by brackets. The floor planks extend beyond the side sills and the ends rest on angles, 3.2 in. \times 3.2 in. \times .4 in., which are supported by brackets riveted to the side sills, as shown in the sectional view. The fixed sides of the car are of steel, .2 in. thick, riveted to the side angles and strengthened by tees, 3.9 in. \times 2.4 in. \times .32 in.

The covered "goods wagon," Fig. 5, has side and end sills and cross-ties of the same section as the car shown in Fig. 4, and is braced diagonally after the manner of the passenger carriage Fig. 2. At the sides of the car body are angles, 3.15 in. \times 3.15 in. \times .4 in., which are supported on brackets riveted to the side sills. These brackets serve also as supports for the side posts of the car body.

The underframe of the "goods car" built by Hurst, Nelson & Co., Glasgow, Scotland, is shown in Fig. 6. It is formed of 9 in. \times 3 $\frac{1}{2}$ in. \times $\frac{5}{16}$ in. steel channels. The joints are made with connection angles and $\frac{5}{16}$ in. cover plates are used at all joints, those at the ends extending the length of the end sills.

Figs. 7 and 8 show the steel frames of the 9-ton mineral wagons built by the same company. In these cars the buffing gear is so arranged that while the buffers are placed near the extremities of the end sills the shock of collision is taken at the center of the latter, making the center sills of greater relative importance than in the other frames illustrated.

In the frame shown in Fig. 7 the side sills, end sills and the intermediate transverse beams, of which there are but two, are 9 in. \times 3 in. \times $\frac{5}{16}$ in. channels. Between the two cross beams are four channels 6 in. \times 3 in. \times $\frac{5}{16}$ in. running longitudinally grouped about the center line of the car, 14 in. between centers horizontally and 3 in. between webs vertically. To these the drawbar is attached. From the cross channels to the end sills extend eight angles 3 in. \times 3 in. \times $\frac{5}{16}$ in., four parallel to the center line of the car and four diagonally. All the minor channels and angles have the web or flange turned up to make closed ends so that no connection angles are required at any of the joints except those between the side and end sills. The flooring is laid transversely except a 6-in. plank at either side of the car that runs longitudinally and is laid upon brackets riveted to the side sills.

The frame in Fig. 8 has for side and end sills channels 9 in. \times 3 in. \times $\frac{5}{16}$ in., and for intermediate cross-ties two angles 6 in. \times 3 in. \times $\frac{5}{16}$ in., spaced 2 ft. between vertical flanges. Two angles of the same size run diagonally from the cross angles to the end sills. Additional

strength is secured at the ends by a $\frac{3}{4}$ in. plate 26 in. wide extending the full width of the car, and by straps across the corners. Connection angles and $\frac{5}{16}$ in. rivets are used at the joints. This is a drop side car and the extreme edge of the floor is strengthened by angles 4 in. in. \times 3 in. \times $\frac{5}{16}$ in. which are supported on brackets to the side sills.

The underframe used with six-wheel passenger cars on the Prussian State Railroads is shown in Fig. 9. The length of the frame varies somewhat according to the class of the carriage and the style of construction; that is, whether with compartments or with longitudinal aisle. The general design, however, is the same for all cars. Channels only are used in these frames. Dimensions of the members and details of the joints are shown in the views of details.

It will be noted that the cross channels are bent downward in the middle so that the intermediate longitudinal channels that rest upon them may have the top flanges in line with the tops of the side sills. The car body rests upon brackets fastened to the side sills as shown in the detail of E.

Fig. 10 shows the frame for 33,000-lb. four-wheel covered freight cars on the Prussian railroads designed in 1895. In the general arrangement and the details of joints between the end and side sills and intermediate members of the frame, this frame closely resembles the one for passenger cars, Fig. 9, but the car body is not framed as a separate structure as in the case of the passenger cars.

In order to support the flooring, angles 3.2 in. \times 2.6 in. \times .36 in. are placed at either side of the car, supported on brackets riveted to the side sills. To these brackets are also fastened the channels or angles placed vertically which serve to support the sides of the car body.

Rate of Combustion and Locomotive Efficiency.

We published in our issue of Sept. 18, an abstract of Professor Goss's paper read before the New York Railroad Club, on the Effect of High Rates of Combustion on the Efficiency of Locomotive Boilers. This paper was discussed at the regular meeting of Sept. 17, and a very brief abstract of that discussion follows:

MR. FORNEY: The evaporation in pounds of water per pound of coal varied in these tests, respectively, 8.26, 7.87, 7.52, 6.67, shows that the evaporation diminished as the rate of combustion increased. That is all very clear and plain. There is one point, however, that it would not be out of the way to mention here: An ordinary passenger engine would burn about 50 lbs. of coal per mile on a grate of, say, 25 sq. ft. of surface. The rate of combustion is almost 61 lbs.; that is the average rate over the whole run of, say, 100 miles, while the maximum is very much higher and the minimum very much lower; and the question is whether the economy would increase with a low rate of combustion. During a large part of the work it is burning less than 61 lbs. per sq. ft. of grate area, and very probably, if it goes down to a very low point, the economy would be less. If you have a Wootton boiler with a very large grate, it might be very much lower than 10 lbs. per sq. ft. So that I think, in that respect, Professor Goss's experiments are not quite conclusive.

From the investigations which he has made, it seems to me probable that what would result in the greatest economy would be a larger firebox and a larger grate area than we have at present. Now, as you know, some recent locomotives built in this country have all their driving axles in front of the firebox. With engines of that kind it is possible to widen out the firebox as much as you want. Mr. Rhodes, of the Quincy road, has experimented for the last few years with an engine of that class, and he told me he was getting 15 per cent. economy out of it, compared with others running alongside of it. Now, if that is accomplished by simply getting a wider and deeper firebox, 15 per cent. economy achieved, it is certainly important for the railroads to know it. Some years ago Frederick Siemens read a paper calling attention to the fact that as soon as the flame came in contact with any solid substance combustion was immediately arrested. You can prove this by putting a wire or a rod into an ordinary gas flame—it will immediately begin to smoke—and his conclusion was that in all furnaces the aim should be to keep the flame away from the sides and top of the firebox until the process of combustion was entirely completed. By having that firebox which Mr. Rhodes has, which is very nearly a cube, it is very much easier to keep the flame away from the top and sides. It therefore seems desirable that we should have a firebox not only of that form, but with the sides of the grate covered with dead plates, and in that way keep the flame away from the sides before it enters the flues; and I believe it is due to that, as much as to anything else, that Mr. Rhodes has achieved the economy referred to. Of course, a large grate has a great deal to do with it; but the protection which the flame has in a large firebox is an important element.

In reading on this subject some time ago, I found an article published in a German paper, in which it called attention to the fact that by injecting a small stream of water into the firebox it would make a more intense combustion than could be obtained without it. The writer had experimented with that method and proved that he could promote combustion in that way. It seems odd to say that by squirting water into a flame you can make it burn more freely. Some time ago in talking with Dr. Dudley, of Altoona, who is an authority on such matters; he said that it was found by some Frenchman that when carbon was entirely free from moisture that it did not readily combine with oxygen. Under those conditions it was, in fact, almost impossible to have them combine, and a certain amount of moisture seemed to be necessary to promote combustion. That is a sort of collateral proof of the correctness of my German friend's experiments.

Another curious fact, and which Professor Goss refers to, is that at a very high temperature a very large amount of carbon monoxide (CO) is formed, and it does not then readily combine to form carbon dioxide (CO₂). In the latter combination very much more heat is developed than when carbon monoxide is formed. This waste approximately occurs at the higher temperatures, and it seems probable that the jet of water has the effect of cooling down the fire, and thus promoting the combustion of the fuel.

There seems to be a sufficient promise of success in the

direction indicated to warrant some of our railroad companies to have thorough series of tests made.

GEO. S. STRONG: Now if we were called upon to design a stationary boiler to give the highest results, we are never willing to go beyond 20 lbs. to the sq. ft. of grate area as the highest rate of combustion the boilers are to be called upon to do; 16 lbs. is considered better. When we get down to 12 lbs. we think we are going the other way; we are going too low. At 12 lbs. we do not get good combustion. If we get above 20 lbs. we get to the wasting point, when the fuel leaves the fire and goes out into the air in finely powdered, unconsumed carbon.

I have noticed on the test made by Prof. Denton and Mr. Deane, on the Old Colony road, between Boston and Providence, where they ran from about 84 lbs. down to 54, they got a saving of something like 20 per cent., due to the reduced rate of combustion when they got down to 54. On the Lehigh Valley we made a number of tests with engines having 60 sq. ft. against engines having 35 sq. ft., and in that case we got about 33 per cent. saving. I due to increased grate area and better combustion. I have no doubt that it will be found that when we can get down below 50 lbs., even as low as 30 lbs., in locomotive practice, we will get good results. The simple fact is that a very large part of the coal is carried through the smokestack in an unconsumed state, in the form of coke which is not consumed, but carried through and out into the air, and this is evidence that a very large amount of fuel is wasted.

How can we reduce the quantity of coal necessary to drive a locomotive? There are a number of ways that are not being utilized to-day. One of the greatest losses you contend with on locomotives is that you feed your locomotive with cold water. If you go to any manufacturer running a large plant and make the proposition to him to fit up his boiler with an injector, he would want to know whether you were insane or a fool.

Talking about things I have experimented with, I put a heater on a Chicago & Alton engine and got a saving of 23 per cent. There was only one trouble with that arrangement—we did not then have any flexible iron connection to force the water through. There is not now any reason why the tender should not be built with a heater under it as a part of it, and force the water with a pump, either located, as we had it, on top of the tender, or as a pump driven from the axle, which would be more economical. That is one source of saving.

MR. WEST: About six months ago we made an experiment on our road with an engine with a firebox 34 \times 72 in., and another engine with a firebox 34 \times 108 in., hauling the same train, and we saved about 1 cent a mile with the larger firebox, doing the same work, hauling the same train, showing that the larger boiler was the most economical for the work.

MR. SAGUE (Schenectady Locomotive Works): Any locomotive man must realize the great value of tests of this kind, as all locomotive designers must frequently feel the lack of experimental data upon which to base their designs. If the problem is brought before us as to how much of an engine we can supply for a certain specified weight on the track, the question at once arises—How much of that weight should be put into the tube heating surface, and how much into the size of firebox? and data on the subject is lacking, and the results of experiments vary greatly. In this connection there are some points in the paper that I would like to comment upon:

The area which represents the loss due to deficient heating surface, can be compared with the area which represents the losses due to increased rates of combustion; and we can therefore, I think, form the conclusion that the loss due to deficient heating surface is greater than that due to deficient grate surface in the ratio of the areas.

It will also be noted that an important part of the loss found in these tests is due to the amount of sparks which were drawn through the tubes. In the test burning 61 lbs. of coal per square foot of grate, this loss was 4.3 per cent., and at 124 lbs. about 10 per cent. Professor Goss speaks of the coal being very friable, and consequently the engine probably emitted a great many more sparks than it would have done with some other grades of coal.

I would also say that the rate of combustion in Test No. 4, 241 lbs., is much greater than anything that is used in locomotive practice, except in a very few special cases of hard service with engines having the deep firebox between the axles and frames; and if we want to get at the loss which occurs in average locomotive service, we would refer to Test No. 3, which shows about 124 lbs. of coal per square foot of grate per hour. Using this figure for some large passenger engines which we have recently built, having about 30 sq. ft. of grate area, would give 3,700 lbs. of coal burned per hour, or nearly 2 tons—a large amount to burn in any locomotive. Mr. Forney has mentioned that locomotives, as ordinarily run, do not show very high rates of combustion; and though they may be reached under certain conditions of service, they do not represent average practice. If the rate of combustion is calculated from the number of miles run per ton of coal, the average figure will be comparatively low; and I therefore think that, instead of assuming that the loss which takes place in locomotives is that which would be indicated by Test No. 4, it would be fair to say that the loss is nearer that shown by Test No. 3.

MR. MARSHALL (American Engineer, Car-Builder, etc.), in looking over the figures as presented here, the point that astonished me most is the loss by sparks. I did not suppose it was as great; and as Professor Goss says that his coal is particularly friable, it may be that the loss is not so great in the ordinary service; but that is something we do not know until more tests are made.

MR. FOWLER: I think that Professor Goss infers in his paper that part of the losses are due to inefficiency of the heating surface, and I should conclude, from his paper, that the remedy would be greater heating surface when the combustion is increased. Of course, in this there are mechanical difficulties, and we have about reached the limits; so that the losses that are due to increased combustion when the engine is forced—and we are compelled to force it, to haul the trains put behind it—it would seem almost a hopeless task to avoid, or to do anything better. The length of time the gases are in the tubes is so short that, if they enter 200 or 300 deg. higher than they do now, why, of course, the amount of heat absorbed must be less where the combustion is higher, although the temperature is higher than it would be with a lower rate of combustion; so that I do not see how that can be remedied. So far as the loss from cinders is concerned I think that we are all surprised that it is so great. I was recently standing by an engine which was being sparked after a run of only 30 miles, and the front end was just full, and the sparks were in elegant condition—just as nice coke as you ever saw.

MR. STRONG: I was talking with the mechanical engineer of one of the Western roads, and he tells me that they are burning, regularly, 225 lbs. of fuel to the square foot of grate per hour.

MR. FOWLER: A few years ago, in Michigan, we had

some coal that was simply atrocious—the worst in the world—and we made some attempts to burn it, and found that with a natural draft we could not do anything with it at all. But we put a steam blower in a closed ashpan, and we succeeded in getting very good results with that very bad coal. The coal is so bad that they do not take it out of the county; but we burned it with a steam blower and a closed ashpan.

Mr. WEST: I was master mechanic of the middle division of the New York, Pennsylvania & Ohio when the experiment was made. We ran four ½ or ¾-in. pipes through the lower row of tubes, and they took steam from the bottom and ran into the firebox, and they were pounded out flat at the ends; and so long as we kept those ends flat we could consume the smoke and also make a nice saving in fuel; but it was almost impossible to keep those ends flattened down sharp.

Mr. FOWLER: I saw that same thing on the Chesapeake & Ohio road, between Sharpsville and Washington, on their "Fast-Flying Virginian." The engineer came over the road with me, and he is delighted with it, and certainly the engine does not show any smoke. I asked him regarding the nozzles he was using, and he said they were having no trouble with them in burning out. I think they are applying that steam just below the firebrick arch. The engine was steaming very heavily when I was on it, and I could not see just what it was.

Mr. HIGGINS (Lehigh Valley Railroad): The paper presented by Professor Goss is of value in a general way, in that it shows the saving that may be effected by having the grate surfaces of locomotive boilers made sufficiently large to reduce the consumption of fuel per square foot of grate per hour to an economical point; but at the same time, I think there is such a thing as having too large a grate surface, and I think steps should be taken to ascertain the maximum limit of grate surface with anthracite and bituminous coal, in connection with the cylinder volume and the class of work that the locomotive is designed for.

I think too much stress has been placed upon the importance of spark losses, as noted under the head of "Conclusions" on page 11. While Test No. 1 was being made, when the engine was working under normal conditions as to area of grate, and particularly as to diameter of exhaust tips, the loss due to sparks, reduced to pounds of coal, equaled 277 lbs., or a little more than

These engines are for use in fast passenger service between New York and Boston. Following are the principal dimensions:

General Description.	
Type.....	8 wheel
Name or number.....	No. 43
Name of builder.....	Schenectady Locomotive Works
Name of operating road.....	New York, New Haven & Hartford
Gage.....	4 ft. 8½ in.
Simple or compound.....	Simple
Kind of fuel to be used.....	Bituminous coal
Weight on drivers.....	86,000 lbs.
" truck wheels.....	45,000 lbs.
" total.....	131,000 lbs.

Dimensions.	
Wheel base, total, of engine.....	23 ft. 9 in.
" " driving.....	8 ft. 6 in.
" " total (engine and tender) ..	51 ft. 6¼ in.
Length over all, engine.....	35 ft. 11 in.
" " total, engine and tender.....	61 ft. 6¼ in.
Height, center of boiler above rails ..	8 ft. 4¼ in.
" of stack above rails.....	13 ft. 10 in.
Heating surface, firebox.....	167.52 sq. ft.
" " tubes.....	1,946.72 sq. ft.
" " total.....	2,114.24 sq. ft.
Grate area.....	30.22 sq. ft.

Wheels and Journals.	
Drivers, number.....	4
" " diameter.....	73 in.
" " material of centers.....	Cast steel
Truck wheels, diameter.....	33 in.
Journals, driving axle, size.....	9 × 12 in.
" " truck.....	6 × 12 in.
Main crank pin, size.....	6 × 6 in.
Parallel rod pins, size.....	5 × 4¼ in.
Cross-head pin, size.....	4 × 4 in.

Cylinders.	
Cylinders, diameter.....	20 in.
Piston, stroke.....	24 in.
" " rod, diameter.....	3¼ in.
Main rod, length center to center.....	7 ft. 10 in.
Steam ports, length.....	10 in.
" " width.....	1¾ in.
Exhaust ports, length.....	20 in.
" " width.....	3 in.
Bridge, width.....	1¼ in.

Valves.	
Valves, kind of.....	Richardson balanced

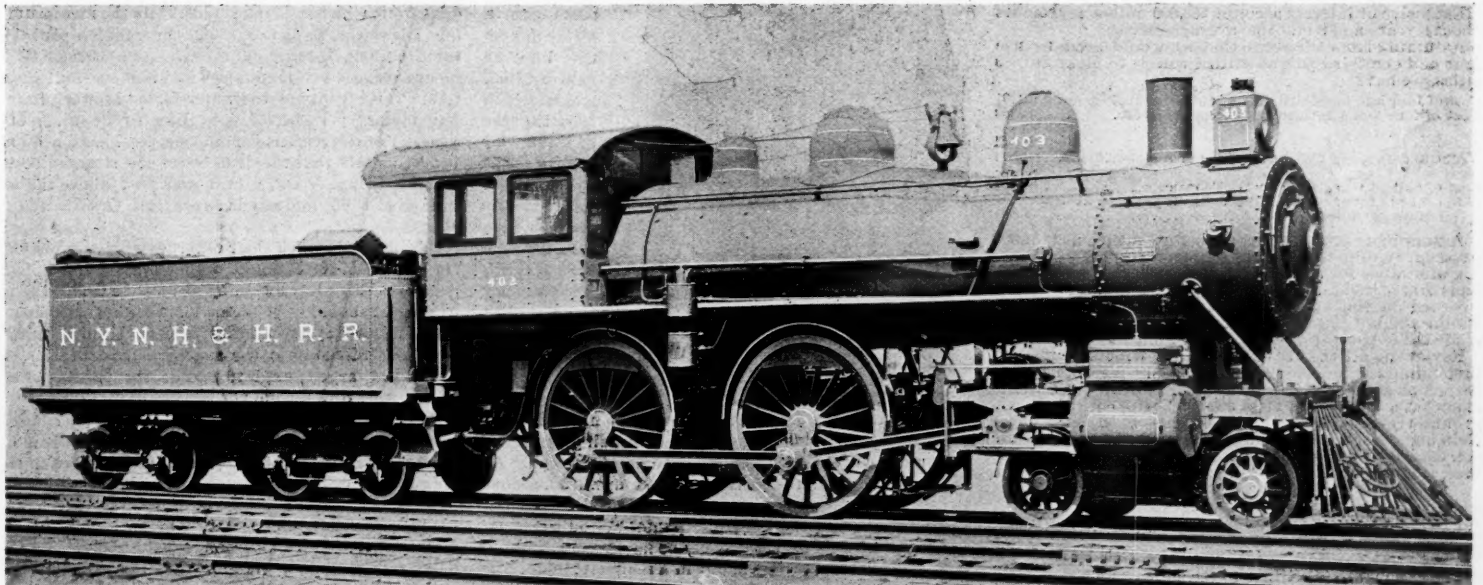
Kind of material in tank.....	Steel
Thickness of tank sheets.....	¼ and ½ in.
Type of underframe, wood or iron.....	Wood
Type of truck.....	4-wheel square wrought-iron frame
Truck with swinging motion or rigid bolster.....	Rigid center
Type of truck spring.....	Semi-elliptic
Diameter of truck wheels.....	33 in.
Diameter and length of axle journals.....	4¼ × 8 in.
Distance between centers of journals.....	75 in.
Diameter of wheel flt on axle.....	5¼ in.
Diameter of center of axle.....	4½ in.
Length of tender frame over bumpers.....	23 ft.
Length of tank.....	21 ft.
Width of tank.....	8 ft. 9 in.
Height of tank, not including collar.....	32½ in.
Height of tank over collar.....	81 in.
Type of back drawhead.....	Miller Hook
With or without water scoop.....	With

Makers of Special Equipment.	
Wheel centers.....	American Steel Casting Co.
Tires.....	Midvale
Axles, driving.....	Taylor Iron
Sight-feed lubricators.....	Nathan Mfg. Co.
Front and back couplers.....	American Steel Casting Co.
Safety valve.....	Consolidated S. V. Co.
Steam heat equipment.....	Consolidated Car Heater Co.
Sanding devices.....	H. L. Leach
Driver-brake equipment.....	American Brake Co.
Tender-brake equipment.....	Westinghouse Air Brake Co.
Tender-Brake Beam.....	Kewanee Reversible
Tender-brake shoe.....	Ramapo Wheel & Foundry Co.
Air pump.....	Westinghouse Air-Brake Co.
Air-pump governor.....	Westinghouse Air-Brake Co.
Steam gages.....	Ashcroft Manufacturing Co.
Engine truck springs.....	Pickering
Driving springs.....	Pickering
Tender springs.....	Pickering
Piston rod packing.....	Jerome Met. Packing Co.
Valve-rod packing.....	Jerome Met. Packing Co.
Engine-truck brake.....	Westinghouse Air-Brake Co.
Air signal.....	Westinghouse Air-Brake Co.
Safety water gage.....	Sherburne

Cast Iron vs. Steel-Tired Wheels.

What follows is from a paper read before the Southern & Southwestern Railway Club, by Mr. R. C. P. Sanderson, President of the Club.

It is the direct interest of the steel-tired wheel men to magnify the danger to passenger trains from broken



Eight-Wheel Passenger Locomotive for the New York, New Haven & Hartford Railroad.

Mr. JOHN HENNEY, JR., Superintendent Motive Power.

Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.

four per cent. of the total amount of coal consumed during the test. It was during tests Nos. 2, 3 and 4 that the loss due to sparks was in any way noticeable or excessive; and tests Nos. 3 and 4 certainly do not represent actual service conditions, as we would hardly expect to have an engine burning bituminous coal, give satisfactory results, using double exhaust tips, diameter of each tip being 2.35 or 1.75 in.

I wish to confirm the figures presented by Professor Goss as to the efficiency of the boiler being decreased when the amount of coal consumed per square foot of grate surface per hour is increased, by results of a test made on the Lehigh Valley road, last fall, with an engine having cylinders 20 × 24 in., grate surface 80 × 114 in.; four pairs of drivers, diameter 50 in.—fuel composed of one-third bituminous and two thirds buckwheat. The tests were made with the engine in actual freight service. During Test No. 1 the weight of dry coal burned per hour per square foot of grate surface was 25.47, and the water evaporated per pound of coal was 4.115. In Test No. 2 the weight of dry coal burned per square foot of grate surface was 22.65, and the water evaporated per pound of coal was 7.021. In Test No. 3 the weight of dry coal burned per hour per square foot of grate surface was 22.25, and the water evaporated per pound of coal was 6.64. These figures, taken from a test made in actual service, I think go to confirm the results of Professor Goss' experiments, as explained in the paper of to-night.

Eight-Wheel Passenger Locomotive—New York, New Haven & Hartford Railroad.

The accompanying engraving shows one of 20 eight-wheel passenger engines built by the Schenectady Locomotive Works for the New York, New Haven & Hartford Railroad. These engines were designed and built from specifications furnished by Mr. John Henney, Jr., Superintendent of Motive Power of that road.

The engines in working order weigh 131,000 lbs. with 86,000 lbs. on the drivers. The cylinders are 20 in. by 24 in., and the driving wheels 73 in. in diameter with cast-steel centers. The boiler is of the extended wagon-top type and carries a working pressure of 190 lbs. The total heating surface is 2,114.24 sq. ft., while the grate area is 30.22 sq. ft.

Valves, greatest travel.....	6 in.
" " outside lap.....	1½ in.
" " inside lap or clearance.....	Line and line
" " lead in full gear.....	¾ forward, ¾ back
" " constant or variable.....	Variable

Boiler.	
Boiler, type of.....	Extended wagon top
" " working steam pressure.....	190 lbs.
" " material in barrel.....	Carbon steel
" " thickness of material in barrel ..	¾ in.
" " diameter of barrel at front sheet.....	63½ in.
Butt joint.....	Sextuple riveted
Seams, kind of, horizontal.....	Well, inside and outside
Thickness of tube sheets.....	double-riveted
" " crown sheet.....	¾ in.
Crown sheet stayed with.....	Radial stays
Dome, diameter.....	30 in.

Tubes.	
Tubes, number.....	312
" " material.....	Charcoal iron No. 11 W. G.
" " outside diameter.....	2 in.
" " length over sheets.....	12 ft.

Firebox.	
Firebox, length.....	9 ft.
" " width.....	3 ft. 4¼ in.
" " depth, front.....	73 in.
" " back.....	59½ in.
" " material.....	Carbon steel
" " thickness of sheets.....	¾ × ¾, back 1 in.
" " brick arch.....	Yes
" " water space, width.....	Front, 4 in.; sides, 3¼ in.; back, 3¼ in.

Grate, kind of.....	Kocking, R. K. Co.'s style
---------------------	----------------------------

Smokebox.	
Smokebox, diameter outside.....	65¼ in.
" " length from tube sheet to end.....	65¼ in.

Other Parts.	
Exhaust nozzle, single or double.....	Single
" " variable or permanent.....	Permanent
" " diameter.....	4¾, 5 or 5¼ in.
" " distance of tip below center of boiler.....	1¾ in.
Netting, wire or plate.....	Wire
" " size of mesh.....	2½ × 2½ No. 10
Stack.....	Taper
" " least diameter.....	16 in.
" " greatest diameter.....	15½ in.
" " height above smokebox.....	2 ft. 9 in.

Tender.	
Type.....	Swivel trucks
Tank capacity for water.....	4,500 gals.
Coal capacity.....	8½ tons.

cast-iron wheels. How often have we heard of a passenger train being wrecked or a passenger being hurt or killed by a broken wheel? A search through the newspaper records of accidents for 1895 showed that there were just twenty-two cases of wrecks or derailments, freight and passenger, caused by broken wheels in the year, while there must have been something like 9,720,000 chilled iron wheels constantly in service under both passenger and freight cars during the year.

Reference to the same record showed that during the year five passengers lost their lives in wrecks due to "defective equipment," which general heading covers a multitude of sins. I could not ascertain definitely that a single passenger had been hurt or killed in 1896 in an accident caused by a broken wheel on a steam railroad, and the number of passengers carried during the year must have been close on 600,000,000. The following is believed to be a fairly correct estimate of the number of accidents caused by broken wheels 1886 to 1894 inclusive:

1886	1887	1888	1889	1890	1891	1892	1893	1894
37	27	48	26	37	39	41	48	33

While considering the question of relative safety, it is proper to mention that the steel-tired wheels are not the perfect panacea for the broken wheel problem. Reference to the M. C. B. reports on steel-tired wheels will show records of very considerable percentage of failures, and reference to the Board of Trade returns for the English railroads, and to the reports from the German Railway Union, show a considerable number of steel-tired wheel failures and some accidents from these, but the figures are not in such shape that comparisons can be made.

Assuming that there are about 34,000 passenger equipment cars in constant service, and that the numbers of wheels in service under these cars (4 and 6 wheel trucks) would approximate 306,000; that a first-class chilled 33-in. wheel weighs 600 lbs., and that the average weight of the steel-tired 33-in. wheels (see M. C. B. report of 1895 is 802 lbs.—some of them weigh over 1,000 lbs.—this would mean that the difference in the weight of this many wheels alone, as between cast-iron and steel-tired wheels, would be 30,900 tons, which we would be burning coal to haul, at speeds up to and over 60 miles per hour, around the country.

Now, as regards the running qualities of steel-tired vs. chilled wheels, it is an indisputable fact that chilled wheels can be turned out equally true for much less cost. I have it on certain authority that it costs 31 cents to grind a pair of new 33-in. wheels, mounted on the axle, and for regrinding old wheels on the axle, 28

cents per pair. And these wheels, when ground, are just as true as any pair of steel-tired wheels ever turned out of a lathe.

Reference again to the report of the Committee on Brakeshoe Tests shows that the friction and loss of metal, where soft steel shoes were used on steel-tires, was far greater than when soft steel shoes were used on cast-iron wheels. The inference is perfectly plain that on curves the rail wear from the flanges of steel tired wheels will be greater than from chilled iron wheels, making a harder pulling train, and necessitating more frequent renewals of rails, which are expensive.

Having touched on the question of safety, weight, running qualities, and rail wear, let us look at the very important question of first and final cost.

A really first-class chilled wheel, cast in contracting chills, can be produced from high grade materials, including royalties, at a

Foundry cost of.....	\$4.60 each
Or say at a selling price of.....	5.00 each
For a pair of such.....	\$10.00 per pair
Add for cost of grinding true.....	21

Cost of the wheels when mounted, exclusive of axle and cost of boring..... \$10.21 per pair

We do not seem to be able to buy a really first-class article in the way of a steel-tired wheel for much under \$50.00 each, although some that promise well are

Offered at (turned) each.....	\$40.00
Two such.....	80.00
Difference in favor of the ground cast wheels.....	\$69.79 per pair
For an 8-wheel car this is.....	279.17 per car
For a 12-wheel car.....	418.74 per car

A reputable firm of steel wheel makers guarantee their wheels (costing \$50 each new) for 260,000 miles; the M. C. B. guarantee for chilled wheels under the same service is 60,000 miles.

The steel-tired wheels will average $3\frac{1}{2}$ turnings to make the 260,000 miles.

First cost of a pair of steel-tired wheels, say.....	\$90.00
Cost of $3\frac{1}{2}$ turnings, shop handling and machine work.....	5.25
Cost of $3\frac{1}{2}$ removals and replacements at 60c.....	2.10

Deduct value of scrap, say 1,108 lbs. at \$8 and \$10 ton of 2,240 lbs.....	\$87.35
	4.94

Cost per pair of steel-tired wheels for 260,000 miles.....\$82.41
Exclusive of interest account 260,000 miles represents about 8 years and 8 months' average service.

Assuming from the above that we would need to use four and one-third pair of chilled wheels to make 260,000 miles, we have

Cost of four and one-third pair of chilled wheels ground.....	\$13.91
Cost of four and one-third replacements at 60c.....	2.60

Value of scrap, say 3,020 lbs., at \$10 per ton of 2,240 lbs.....	\$46.51
	22.41

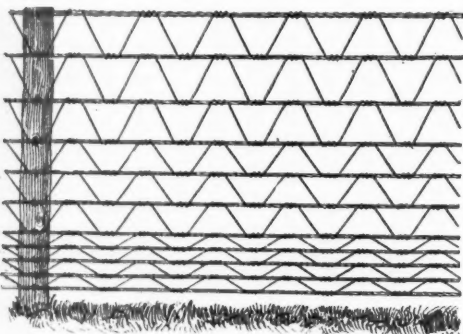
Cost of chilled wheels to run 260,000 miles.....	\$24.10
Difference in favor of the chilled wheels per pair at the end of 260,000 miles, say.....	\$58.31

Assuming that there are, as before mentioned, 34,000 passenger equipment cars in constant service, and making allowance for the number of six-wheel trucks under a portion of them, the difference in the amount of money invested in the one item of first cost of wheels alone would amount to about \$1,863,540, and this does not include the extra cost of stock wheels, machinery, etc.

Reviewing all the above arguments which, while not pretending to absolute accuracy in some respects, are as correct as necessary, it seems proper to draw the conclusion that a really first-class 600-lb. 33-in. chilled wheel, ground true, costing perhaps 30 cents to 50 cents more than an average wheel, bought on rigid test and guarantee, especially marked and reserved for passenger service, is good enough for ordinary U. S. railroading.

A Woven-Wire Railroad Fence.

The accompanying illustration shows the woven-wire fence, made by the McMullen Woven Wire Fence Co., Chicago, which is especially adapted to railroad fencing. It consists of 11 horizontal wire cables, the top cable being made up of four strands of No. 12 wire, and the other 10 of two strands each, of No. 12 wire. Between these cables, are wound, as shown, intermediate wires, which are single, No. 14. The four lower spaces be-



A Woven Wire Fence.

tween cables are each $3\frac{1}{2}$ in. wide, the three middle spaces each six in., and the three upper spaces each nine in. wide. The total height of the fence is 50 in., and the posts are best placed at 33 ft. intervals.

The makers claim that the cables are so wound as to provide for all strains resulting from expansion and contraction due to changes in temperature. This fencing is ordinarily made of Nos. 12 and 14 wire, as described above, but is also furnished of either heavier or lighter wire.

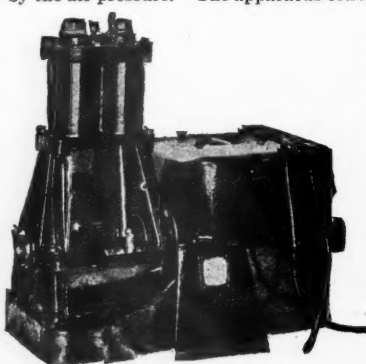
Air-Brakes on the Nantasket Beach Line.

Some description of the electric road on the Nantasket Beach line of the N. Y., N. H. & H. R. R. was given in the *Railroad Gazette* May 14 and June 14, 1895, and July 3 of the current year.

It will be remembered that on the line from Pemberton to Nantasket Junction, 6.91 miles, the cars are run by overhead trolley contact. From Nantasket Junction to East Weymouth the electricity is taken by means of sliding contact-shoes from a third rail laid on the sleepers in the center of each track. When the cars start from the junction station, momentum is given to the car by electricity taken from the overhead wire and the car is carried over to the third rail. The trolley then slips from the termination of the overhead wire, is pulled down and hooked, and the shoe comes in contact with the surface rail. A knife-switch under the hood of the car is then closed, and the current from the rail is thrown into the motors.

One shoe is placed between the axles of each truck immediately under the king pin. It is suspended by two links, and thus hangs loosely. This allows it to slide over the surface of the third rail without difficulty and to make perfect and continuous contact. No rail are laid over the crossings. The distance between each of the shoes on a car is 33 ft.; thus at crossings which are less than 30 ft. wide one shoe is always in contact with the end of one section or the beginning of the next; at wider crossings the impetus of the moving car brings the shoes into contact again before the car can come to rest. Each shoe is a cast-iron plate 12 in. long and 5 in. wide. It weighs about 20 lbs. and is connected to the motor by a flexible cable.

The air for the brakes is supplied by an electrically driven air compressor, which is automatically controlled by the air pressure. The apparatus consists of a double



Air Compressor.

The capacity of the pump is $52\frac{1}{2}$ cu. ft. of free air per minute working against 90 lbs. pressure per square inch. At this pressure the speed is 250 revolutions at 600 volts.

The air compressor is piped directly to the main reservoir, and is controlled automatically by a pneumatic governor consisting of a cylinder containing a piston working against a spring. The pipe running from the main reservoir enters the cylinder below the piston. As the pressure rises the piston is forced upward against the spring. The other end of the piston rod carries the contacts through which the pump motor circuit is made and broken. Any arcs that may be made when the contact is broken are blown out in a magnetic field, the coils of which are connected directly in series with the motor.

As the pressure in the reservoir falls from 5 to 7 lbs., the piston is forced back into its normal position by the spring. The contacts are pushed down to their seat, the circuit is closed, current flows to the motor and the compressor starts. The circuit remains closed until the pressure reaches normal, when it overcomes the force of the spring, forces the piston upward, separates the contact, breaks the circuit and the motor stops. This operation is repeated automatically, the combination of motor and pump requiring practically no attention. These automatic governors can be adjusted to any pressure from 45 to 100 lbs., and work on a difference of from 5 to 7 lbs. in pressure. The General Electric Company designed this combined air-pump motor and automatic governor, which takes the place of the oscillating-cylinder type of air-pump originally used on the motor cars.

The Iron Gates of the Danube.

The canal through the Iron Gates of the Danube, begun in 1890, has at last been completed, and on Sunday, Sept. 27, it was formally opened and inaugurated by Emperor Francis Joseph, of Austria-Hungary, who, in company with King Charles, of Roumania and King Alexander, of Servia, made the first trip through the new waterway. The completion of this canal marks the most important epoch in the history of the regulation of the Danube. The obstruction which the Iron Gates has presented to the navigation of the river has been far more serious in its effects and far more difficult of removal than that found at any other point of the lower Danube.

The Danube leaves the level plain of Hungary at Bazias, in the extreme southern part of the country, and from that point to its mouth the river is known as the Lower Danube; it is here that the cataracts and obstructions to navigation are found. At a distance of 44 kilometers below Bazias the first cataract, the Stenka, is met with. This obstruction, although comparatively unimportant, greatly restricts the flow of the river and makes navigation difficult. The next obstruction in the

course down the river occurs 17 kilometers further on where the water throws itself against the cliffs of the Dojke, which in turn force it back at nearly a right angle to the opposite shore. The river is here only 380 meters wide and for a distance of three kilometers a violent eddy occurs. The next cataract in order, the Tachtalia, was, next to the Iron Gates, the greatest and most dangerous obstacle to navigation; this occurs 70 kilometers below Bazias. At this point the flow is barred first by the Greater and Lesser Tachtalia, after which it strikes the point of Greben, which contracts the river to a width of 420 meters. A whirlpool and bad eddies are met with at the foot of the Greben, which make navigation very difficult and dangerous, particularly during flood time. The cataract of Jucz is 11.5 kilometers below Greben; here a bank of serpentine extends across the channel, obstructing the flow at time of low water, and causing a very considerable fall, being two meters to the kilometer, with the water at many places only a few centimeters deep. Fourteen kilometers below this cataract are found the Straits of Kazan, here the river is narrowed down, and flows for four kilometers between steep cliffs, with a width varying from 170 to 380 meters, and a depth of 20 to 50 meters; it is here that are found the ruins and remains of the famous "Way of Trajan," which was completed by the Emperor Trajan, A. D. 103, and thus gave an opening up the Danube for the Roman legions, who used the way as a tow path.

At a distance of 18 kilometers from Kazan and 120 kilometers (75.4 miles) from Bazias begin the Iron Gates. This would be best described as consisting of three parts. The first is the entrance, or sill, which dams up the water and produces an eddy, but has no reefs rising out of the water to endanger navigation; the second part is the Iron Gate proper, and includes the rock Prigrada, with the other dangerous reefs and peaks; the third part is the deep pool below the Prigrada, where the water, in falling over the rocks, forms very dangerous whirlpools and rapids. Here the maximum fall is at low water, being then about three meters per kilometer (3 in 1,000). Throughout the whole obstruction the gradient averages five meters per two and one-half kilometers. The velocity of the water varies between four and five meters per second, according to the season of the year. For convenience of finding its location on maps it may be said that the Iron Gates are situated between Austria-Hungary and Servia, and just above the small village of Sibb, midway between Alt Orsova and Gladova.

In connection with their other extensive works along the Danube, the Romans, under Trajan, attempted to overcome this obstruction by means of a canal, the ruins of which are still to be seen. This canal consisted of a small water-way, two miles in length, built from the village of Sibb, along the southern bank of the river, but it was large enough to permit the passage of boats, which were towed from the bank.

From the time of the Romans, nothing of account was done toward improving the navigation at the Iron Gates until the early part of the present century, when the increasing demands of commerce again brought the matter to the front. Nothing of importance was done, however, until after the Crimean War, when, in 1855, Wex and Mensburger were called upon by the Austrian government to draw up a plan for the improvement of the river.

In 1870 the distinguished American engineers, Mr. William J. McAlpine was invited by the Danube Navigation Company to examine the Danube at and above the Iron Gates, and make a report on the improvements necessary. Mr. McAlpine made his report in 1871, and it is a great tribute to his skill and ability as an engineer that the plans which were finally adopted, and upon which this great work was subsequently carried out, were on the same general lines as his recommendations.

An international commission sat in London, in 1874, as a result of which a local commission was appointed the following year, which issued plans for the amelioration of all the difficult parts of the river. The Russo-Turkish War, together with financial difficulties, however, still delayed the commencement of active work. Finally, in 1889, through the energy of Gabriel von Baross, Hungarian Minister, nine million florins were voted for the regularization of the Danube, and in December of that year bids were called for, on the plans of Ernst Wallandt, Chief of the Technical Bureau, organized to control the execution of the works.

The contract was finally let on May 22, 1890, to a syndicate, composed of Julius Hajdu, Hugo Suther and the Berlin Discount Society. Work began on Sept. 18 of the same year.

The canal as now finished begins above the reef of Prigrada, with its mouth 400 meters in width, from which it gradually narrows down to its normal width, 80 meters. It extends along the right, or Servian bank of the river, a total length of 2,480 meters (1.54 miles). Its depth at low water will always be at least two meters. The two embankments are five meters higher than the maximum high-water mark; the southern embankment is six meters wide at the top, and the northern four meters wide, with slopes of one in one and three-quarters toward the canal, and one in two toward the river. The excavation of the canal itself was finished in March, 1894, but considerable work remains yet to be done on the approaches at each end, to permit of the required depth of two meters, at low water.

The total cost of the Iron Gates Canal has been $5\frac{1}{2}$ million florins (\$1,974,500), more than one-quarter of the entire cost of the regularization of the Lower Danube.

The East-River Front—New York.

The Dock Commissioners of New York have lately received from the Board of Consulting Engineers its report on the East River front. We published some months ago the able report of the Board on the North River front. The members of the Board are General Craig-hill, Chief of Engineers, U. S. A., Mr. George S. Morison and Prof. William H. Burr, all Members American Society of Civil Engineers. A few extracts from the report on the East River follow:

"At the request of your Board, statistics were collected showing the changes in the foreign business done by sailing vessels at this port for the last 10 years. These show a steady decrease in the number and tonnage of sailing vessels engaged in this trade. If the section of the water front between the Battery and the East River Bridge has accommodated this business in the past, it should be equal to accommodating it in the future.

"This business is now principally on uncovered piers. We can see no reason why this class of traffic would not be better accommodated on covered piers, and if the piers were covered they could be used for tramp steamers and other purposes when not required for sailing vessels.

"The objection to shedding these piers is peculiar, and one which it seems should be remedied by legislation. As the law now is, a sailing vessel can claim the right to a berth at any uncovered pier not in use, on paying the regular wharfage charges; as soon, however, as the lessee of the pier has put a shed on it this right ceases and the lessee has the exclusive control of the pier.

"Your board recommends that steps be taken to secure legislation by which the right to build sheds and to have the exclusive use of the piers may be separated at the discretion of the Board of Docks, so that it may have the authority to allow sheds to be built on piers without at the same time giving an exclusive use of the same."

The board suggests that a harbor for canal boats be arranged on the upper part of the North River front.

Regarding the section above the Brooklyn Bridge, largely used by the New York & New Haven Railroad, the report says:

"In our report of Feb. 6, 1896, we stated that the method of accommodating railroads on the marginal street along the North River should be made the subject of a further communication. The railroad accommodation on the East River should be considered at the same time. The subject is one of very great importance, and so far as the East River is concerned it will probably call for some radical changes.

"If a large portion of the freight traffic of the New York, New Haven & Hartford Railroad has to be accommodated in this section of the city, that railroad already running its trains into the city proper, it would seem as if some method should be devised by which the railroad should reach this district by land, rather than by water.

"The transfer of the Sound steamboat lines from the North River to the East River is a matter of very great importance, but it involves so many questions that it must be handled with a great deal of care. So far as passenger travel is concerned, there would seem to be no doubt that this location, near the foot of East Twenty-third street, would accommodate the traveling public very much better than the present terminal in the lower part of the city. Those people whose business is in New York City would undoubtedly prefer the Twenty-third street location, especially as the boats could sail half an hour later than from their present piers.

"The sound lines, however, have always exchanged a large number of passengers with the railroads terminating in Jersey City, and the present piers are convenient for this traffic. On the other hand, the Erie Railroad has for many years maintained a ferry to the foot of West Twenty-third street, and the Pennsylvania Railroad is about opening a ferry to the same point.

"With these two ferries in operation, and the Twenty-third Street Railroad operated as a cable line, the transfer from Jersey City to the foot of East Twenty-third street would be little more difficult than to the piers on West street from which the boats now run, and if an allowance be made for the difference between sailing times from the North River and the East River piers, the actual time consumed by passengers between Jersey City and Hell Gate would be less than by the present route."

Brooks Freight Locomotives for the Great Northern.

We illustrate a mogul freight locomotive which has recently been built by the Brooks Locomotive Works for the Great Northern Railway. This locomotive is one of an order of 12 which has just been filled for the railroad company. It has six coupled drivers, 55 in. outside diameter, and a two-wheeled radial and swing leading truck. The boiler is the Brooks Company's patent, improved Belpaire wagon top, with conical connections; the shell is made throughout of homogeneous steel. The guides and cross-heads are of the Laird type, with two bars for each cross-head. The tender is of 4,000 gals. capacity. The tender frame is of 10-in. channel steel, and the truck wheels 33 in. diameter.

The table which follows gives a description and the general dimensions:

Description and General Dimensions.

Type.....	Mogul, freight
Name or number.....	371
Name of builder.....	Brooks Locomotive Works
Name of operating road.....	Great Northern
Gage.....	4 ft. 8½ in.
Simple or compound.....	Simple
Kind of fuel to be used.....	Bituminous coal
Weight on drivers.....	114,000 lbs.
" total wheels.....	16,000 lbs.
Wheel base, total, of engine.....	130,000 lbs.
" driving.....	21 ft. 6 in.
" total (engine and tender).....	14 ft. 0 in.

Wheels and Journals.

Drivers, number.....	6
" diameter.....	55 in.
" material of centers.....	Cast iron
Truck wheels, diameter.....	30 in.
Journals, driving axle, size.....	8 in. x 9 in.
" truck.....	5¼ in. x 10 in.

Cylinders and Valves.

Cylinders, diameter.....	19 in.
Piston, stroke.....	26 in.
" rod, diameter.....	3¼ in.
Kind of piston-rod packing.....	Jerome's metallic
Valves, kind of.....	Richardson balanced

Boiler.

Boiler, type of.....	Patent improved Belpaire wagon top
" working steam pressure.....	180 lbs.
" material in barrel.....	Homogeneous boiler-steel plates
" thickness of material in barrel.....	¾ and ¾ in.
" diameter of boiler.....	63 in.
Seams, kind of horizontal.....	Quadruple and quintuple-riveted
" circumferential.....	Double-riveted
Thickness of tube sheets.....	¾ and ¾ in.
" crown sheet.....	¾ in.
Crown sheet stayed with.....	Belpaire stays

Tubes and Firebox.

Tubes, number.....	250
" material.....	Standard make
" outside diameter.....	2 in.
" length over sheets.....	11 ft. 1 in.
Firebox, length.....	8 ft. 2 in.
" width.....	2 ft. 8 in.
" material.....	Homogeneous firebox steel
" thickness of sheets.....	¾ in.
" Crown, ¾ in. side, ½ in.; back, ¾ in.; flue, ¾ in.	
" water space, width.....	Front, 4 in.; sides, 3¼ in.; back, 3¼ in.

Grate, kind of.....	Great Northern Railway's pattern
Smokebox, kind of.....	Extension front
Stack, straight or taper.....	Taper

The Siberian Railroad.

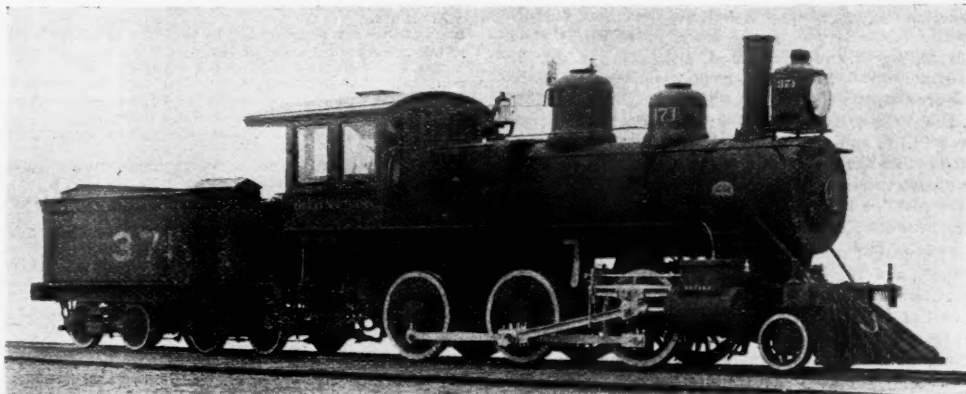
[Some of the matter here related, together with much more, has been given in former numbers of the *Railroad Gazette*, to which the reader is referred. Previous articles are: The Siberian Railroad, being a review of Colonel Woloshinow's discussion of the various proposed routes, July 10, 1891; the Western Section of the Trans-Siberian Railroad, giving the favored route and the character of the country along it, February 17, 1893; the Siberian Railroad, giving the progress of the enterprise, December, 8, 1893; The Siberian Railroad, a description of its progress, January 11, 1895; climate along the route of the Trans-Siberian Railroad, April 10, 1896, and the Siberian Railroad, progress of work on, from the consular reports, Aug. 7, 1896. On account of the interest shown in the recent visit of Prince Hilkooff, Minister of Transportation of Russia, to this country, and also in the reported permission of the Chinese government for a line across Northern Manchuria, it is believed not to be amiss to gather into a consecutive narrative some of the more important particulars of this great enterprise.]

As early as 1858 a proposal, with the end in view of building a railroad from Moscow to the Straits of Tar-

money. A change in the Imperial Ministry, which placed Serge Witte, former Director of the Department of Railroads, at the head of the Ministry of Finance, reversed the former policy. Serge Witte decided that the Siberian Railroad should be built with Russian capital by Russian engineers, and that work should begin as soon as possible. Accordingly, on February 21, 1891, this plan was presented to the Emperor for approval; on March 17, of the same year, the question was decided in the affirmative, and on May 12, 1891, while Nicholas II. was still Czarovitch, he turned the first spadeful of earth at the inauguration of the construction, in Vladivostok.

The plan settled upon is that of an all-rail route, and the line chosen begins at Slatousk and proceeds easterly through Tcheliabinsk. Between the last-named place and Vladivostok the work is divided into three parts, and these again into sections, of which there are seven in all, viz.: The Western Siberian, from Tcheliabinsk to Atchinsk, 1,279 miles; the middle Siberian, from Atchinsk to Irkutsk, near the west shore of Lake Baikal, 790 miles; the Baikal circuit, from Irkutsk to Misofskia, near Lake Baikal, 194 miles; from Misofskia to Stratensk, 664 miles; the Amoor section, from Stratensk to Khabarovka, 1,376 miles; the North Ussuri, from Khabarovka to Graftskaya, 215 miles; and the South Ussuri, from Graftskaya to Vladivostok, a distance of 258 miles, making a total of 4,776 miles, not including the principal branches from the main line.

For nearly the whole of the Western Siberian section—that is, from the Russian frontier eastward to Tomsk about 1,000 miles, the road follows a comparatively straight line across a vast plain, a great deal of which is marsh and swamp land. Beginning at Tomsk, the character of the country assumes an entirely different aspect, being mountainous as well as hilly, and covered with forest. This character of country continues for about 1,000 miles to Irkutsk, the capital of East Siberia. Leaving Irkutsk, the survey is toward the east, across the Angara River, to the shore of Lake Baikal and then around its southern end. From Lake Baikal to Stratensk, on the Amoor, the line of the survey goes through some mountainous country. From Stratensk the line follows the Amoor



Mogul Freight Locomotive—Great Northern Railway.

Mr. J. O. PATTEE, Superintendent Motive Power.

Built by the Brooks Locomotive Works, Dunkirk, N. Y.

tary at the east of Siberia, was made to the Russian government by English capitalists, Messrs. Morrison, Horn and Sleigh; but this scheme was rejected largely for political reasons. It was not until 1891 that the question of a Trans-Siberian railroad was actually settled. In the meantime, though, a number of schemes had been proposed and studied, but the government had continued to interest itself in the extension of its general system of railroads, which, at the time of its final decision, ended at three different points toward the east, viz: Orenburg, on the Ural River; Slatousk, on the Ooi River, among the Ural Mountains, and there was in addition a road from Perm, on the Kama, a branch of the Volga River, through Ekaterinburg to Tioumen, on the Tura. Colonel Woloshinow, previous to the government's decision in the matter, had discussed three different plans for the road; one was an all-rail route of 4,994 miles, from Slatousk to Vladivostok, on the Sea of Japan, with an estimated cost of 341,000,000 roubles, that is, about \$256,000,000; another from Tomsk, on the Tom, a tributary of the Obi River, to Stratensk, on the Amoor River, crossing Lake Baikal by steamboats, with another line of railroad between Graftskaya, on the Ussuri River, to Vladivostok, or 1,972 miles of track, costing 122,000,000 roubles, or \$90,000,000, and a third, following the same line, except that the road was to be continued around the southern end of Lake Baikal and extended down the Amoor to Jernayevo, with a road the entire distance from the Amoor to Vladivostok, requiring 2,900 miles of track, and costing 218,000,000 roubles, or \$164,000,000. It was only for financial reasons that the last two mentioned routes, utilizing the waterways in part, were considered at all; these would be available through about six months of the year, while the rivers are open, with the aid of steamboats.

In 1890, a special commission, formed under Imperial Minister Vyshnegradsky, had considered the question of building the railroad with foreign capital. While some Americans and others thought favorably of the plan, still foreign capitalists hesitated to invest their

about 1,400 miles to Khabarovka. Thence it goes south-westerly, 600 miles, to Vladivostok.

Between Tcheliabinsk and the Obi, or the greater part of the first division, several large rivers are crossed, among which are the Tobol, Ishim and Irtysh, requiring a good deal of bridging. The character of this section permits grades of not more than .74 per cent., and the radii of curves not less than 1,750 ft. After crossing the Obi, and within a distance of 400 miles, or as far as Atchinsk, three other rivers are crossed, namely, the Tom, Yaya and Kiya. This part of the road is through a hilly country, but nevertheless the grades are limited to 0.8 per cent., and the radii of the curves are the same as before.

From Atchinsk to Irkutsk, nearly 800 miles, the road proceeds through a mountainous district, requiring somewhat heavier grades, and curves with smaller radii, and embankments sometimes reaching the height of 70 ft. Many rivers are crossed, including the Yenisei, which is spanned by a bridge 3,150 ft. long, the Chulym and others. The Kan is spanned by a bridge 1,400 ft. long, the Uda by one of 1,050 ft. and other rivers by smaller ones. In all there will be 100 bridges, ranging in value from \$25,000 to \$30,000 each, together with numerous smaller structures. There are also important bridges across the large rivers.

From the Yenisei River the road makes its ascent, first along the Berezovka River, then through the valleys of others, finally reaching a summit level, after which the route winds on through the mountains to Polovina station, from which place to Irkutsk the country is more level, and only two rivers, the Belaya and the Maltinka, are crossed. From Irkutsk the road passes along to the shore of Lake Baikal, near which it continues for over 100 miles to Misofskia station, after which it proceeds through the valley of the Irkut, where the road will be built in cuttings at the sides of the river. Where the route crosses the Zyrkyzunska chain a tunnel 8,330 ft. long will have to be built. From the Misofskia, after again running near the shore of the lake, the line then follows the Celenga, which it crosses with a bridge 3,185

ft. long. From this point it passes into the Valley of Uda, and thence along the Pogromnaya River. It then enters the Vitimsk plateau, winding along the River Domna, finally reaching the summit level of the basins of the Lena and the Amoor rivers, whence it descends, winding round by the town of Chita, on the Shilka River, to Stratsensk. From Stratsensk it continues along the valleys of the Shilka and the Amoor and the Ussuri rivers, on the border of the Russian and Chinese empires. The road at last comes out through the valley of the Suyfun River, and passes along the shores of the Ouglov and Amoor gulfs to Vladivostok, where the station is on the Bay of the Golden Horn.

The accompanying table gives the costs of the various items of the construction for each of the seven sections. In converting the Russian units into those in use in this country, the verst has been considered as equal to 0.663

3. To have the fewest possible number of detachable parts.

4. To require the minimum amount of labor to keep it up.

5. Great adaptability, so that it can be quickly altered or arranged to suit changing conditions such as the adding of new divisions or shops, etc.

After wrestling with the engine-board question in various shops for years, we have on the Norfolk & Western finally developed an engine board which is believed to fulfil the above conditions as perfectly as can be expected from an inanimate object, which arrangement and design I now wish to bring to the notice of the members, and through the club to the mechanical and other railroad officers of the country generally. The design is not patented, is free to all, and it is believed that any railroad officer who has need for a comprehensive engine board, to fulfil the above five conditions, will find the board of the greatest assistance in his daily work and easily and cheaply made at any shop.

The engine board itself consists of a plain pine or poplar board, of suitable dimensions, on to the face of which are secured by screws a succession of horizontal

A New Ventilating Apparatus.

The Dustless Railway Coach Co., of St. Louis, has sent us a description of a device for ventilating passenger cars which it has recently brought out.

When a passenger desires fresh air he turns a knob which is within easy reach, thereby throwing open one of the air deflectors on the outside of the car. The deflector catches the breeze produced by the forward motion of the car and forces it through the water-drenched ventilators which is illustrated by Fig. 1. The strainer is placed in the wall between the windows. After passing through this strainer, the air enters the car through an iron panel-work between the windows beside the passenger's seat, and the force of the current may be regulated at pleasure by turning the knob.

The water to drench the wire-fabric air filters, shown in Fig. 2, is delivered by means of a horizontal pipe

ESTIMATE OF THE COST OF THE TRANS-SIBERIAN RAILROAD.

Enumeration of districts.	Length in miles.			Cost of labor (without tunnels), mostly bridges, rails, fastenings, small supplies, etc., and delivery of the same.		Cost of work for tunnels and bridges with span more than 700 ft.		Price of steel rails, fastenings and small supplies, with delivery of same.		Total cost.	
	Principal line.	Branch.	Total.	Total.	For one mile.	Total.	For one mile.	Total.	For one mile.	For entire line.	For one mile.
1. Tcheliabinsk, Omsk, Atchinsk, with branches to the cities Omsk, Tomsk and to the rivers Tobol, Ishim, Irtysh, Obi and Tom.	1,279	106	1,385	\$24,177,900	\$11,574	\$4,425,100 (a)	\$2,118	\$17,895,300	\$8,565	\$46,498,300	\$22,257
2. Atchinsk, Krasnoyarsk, Kiensk, Nijni-Oudinsk, Irkutsk, with the branches to the rivers Yenisei and Igar.	790	3	793	19,790,100	16,548	6,425,500 (b)	5,373	13,455,100	11,250	39,670,700	33,171
3. Irkutsk, Misofskia, with the branches to Lake Baikal and to the rivers Celenga and Shilka.	191	.....	191	11,340,900	38,706	2,049,800 (c)	6,996	3,735,700	12,750	17,126,400	58,452
4. Misofskia, Stratsensk, with the branches to Lake Baikal and to the rivers Celenga and Shilka.	664	5	669	24,617,400	24,396	2,524,500 (d)	2,502	13,928,600	13,803	41,070,500	40,701
5. Stratsensk-Khabarovka.	1,376	.....	1,376	51,000,000	24,579	11,250,000 (e)	5,421	23,012,500	13,500	90,262,500	43,500
6. Khabarovka-Grasskaya.	215	.....	215	8,002,500	24,900	.....	.....	3,412,500	10,500	11,505,000	35,400
7. Grasskaya, Vladivostok, with the branch to the river Ussuri.	258	3	261	9,417,300	24,539	337,500 (f)	858	4,090,200	10,407	13,875,500	35,304
Totals and averages.	4,776	117	4,893	\$148,466,100	\$23,535	\$27,012,400	\$3,324	\$81,529,900	\$11,539	\$260,008,400	\$38,396

of a mile, and the rouble equal to 75 cents, this being approximately the value of the silver rouble, which is the legal unit of money. From the last column of this table, which gives the total cost per mile, a comparative idea can be obtained of the engineering difficulties the country presents for each section.

The quantity (a), \$4,425,000, includes the cost of bridges over the River Irtysh, to the value of \$1,275,000; Obi River, \$2,100,000, and River Tom, \$1,050,000. In (b), the cost is included of bridges over the River Chulym to the value of \$544,200; the Yenisei, \$2,362,500; the Kan, \$749,200; the Birinsa River, \$758,700; the Uda, \$345,300; the Oka, \$396,100, and the Belaya River, \$405,900, together with \$863,500 for two viaducts. The quantity (c) is the cost of two tunnels, with a total length of 12,754 ft. In (d) the cost of a bridge over the Celenga, \$2,175,000, and of one over the Kertcha, \$349,500 are contained. (e) contains the cost of a bridge over the Amoor, estimated at \$6,000,000, and the other \$5,250,000 is estimated as the cost of building other large bridges. The amount (f) is the cost of a 1,750-ft. bridge over the Ussuri.

As we may suspect, this enterprise on the part of the Russian government is largely military, and is being hurried to completion as rapidly as contractors will present themselves.

From conversation with Prince Hilko, we learn that rails are now laid on the following portions of the line: Tcheliabinsk to Krasnoyarsk on the Yenisei, 1,400 miles; from the Yenisei eastward, 150 miles; from Vladivostok northward 400 miles. Between Lake Baikal and the Amoor (about 600 miles) about half the grading is done; and all the grading is done between Lake Baikal and the end of the rail on the west side. It is the purpose to have all rails laid for the whole line, except the 1,400 miles down the Amoor, and the loop around the Southern end of Lake Baikal in two years. For the present the lake will be crossed by a car ferry when the ice is not too thick, and by rails laid on the ice when the ferry is stopped. This distance is about 40 miles. The line down the Amoor, 1,400 miles, may be completed in four years, but this is a little uncertain. For half the year this part of the line can be worked by steamboats, and if a favorable line can be built across Manchuria, the Amoor line may never be built. By a survey from Lake Baikal across this country to Vladivostok, it has been learned that such a line would shorten the route about 665 miles, and at the same time avoid very serious engineering difficulties, besides being of great commercial value, because it would then lead through a thickly settled and rich country. The rails used on the road weigh 49 lbs. to the yard. This, Prince Hilko says, is a mistake, and one that was made before he assumed control.

With the completion of the railroad to Krasnoyarsk, Russia has a continuous route from St. Petersburg to the Yenisei River, a distance of 3,056 miles.

The Norfolk & Western Engine Board.

An engine board designed and used on the Norfolk & Western was described by Mr. Sanderson at the last meeting of the Southern & Southwestern Railway Club. We reprint from the *Transactions* of the club the essentials of his description.

The requirements that a first-class engine board should have are believed to be as follows:

1. Moderate size.
2. To show all needful information at a glance.

thin metal strips (brass, Russia iron or something similar). These strips when in place form a succession of horizontal grooves. The headings, names of divisions and shops are indicated by cardboard labels, slipped into the label-holders, which are simply hung on the metal strips at convenient positions and can be changed at libitum to suit changing conditions by shifting them about, taking them off or changing the cards in the label-holders.

The engines are represented by tags of a peculiar form. The tag is made of a sheet of tin, which has a small piece of brass wire soldered to it, to form a center for a cardboard dial. The printing on the dial can be varied to suit the different requirements. In the case of the dials shown the marking has the following meaning:

1. Repairs required—No. 1—which means general rebuilding.

2. Repairs required—No. 2—which means new firebox and general overhauling.

3. Repairs required—No. 3—which means general overhauling, with heavy renewals of worn-out parts.

4. Repairs required—No. 4—which means light general overhauling.

5—Repairs required—No. 5—which means light repairs, such as can be done in four or five days without removing wheels.

S—Repairs required—special—which means such as broken frame; broken wheel, 50 flues, etc.

W—Repairs required—wrecked—only used in case of heavy wreck damage.

G—Means in good or fair order, in condition to render efficient service, and requiring nothing but current maintenance and running repairs.

A notch or gap in the tag allows one of the figures or letters mentioned above as indicating the condition of the engine to show. As the condition changes, the dial can be quickly rotated so as to show the letter or figure representing the changed condition. Above the notch or gap in the tag is painted the engine number and the class letter or mark. Above the number and class letter is a little pocket formed when folding the tin which is used to hold small labels, either to represent the class of service of an engine in service, such as passenger (through or local); freight (through or local); pushing or helping, shifting, maintenance of way, extra or reserve, etc. In case of engine out of service in the shops a small card label, as shown, is slipped into this pocket to show on what division the engine was in service before she was shipped.

In the case of the engine board in use in my office the board is divided into two portions under the general headings of "Engines in Service" and "Out of Service." In the portion of the board used to cover the engine in service the names of the divisions are shown on the extreme left by card labels in holders. The passenger engines are grouped next to the name of the division; a small gap is left then come the shifting engine; again a gap is left, then come the maintenance of way or pushing engines; again a gap is left, then come the freight engines to the right; the freight-engine tags are grouped by tens for quick counting. It can be seen at a glance by this arrangement:

1. How many engines are in passenger service on any division.
2. How many engines are in shifting service on any division.
3. How many engines are in M. of W. service on any division.
4. How many engines are in helping service on any division.
5. How many engines are in local freight service on any division.
6. How many engines are in through service on any division.

If an engine has to be transferred or sent to shop the tag is simply lifted off the strip where it hangs, dropped on to the strip where it belongs, and the other tags pushed along with the finger to keep them in the proper grouping.

In the portion of the board covering the engines "out of service," shipped for repairs, it is to be noticed that each shop label is wide enough to cover two strips, the upper line being used to cover engines that are actually in the shop undergoing general or heavy repairs, the lower line being used to cover engines awaiting their turn for such repairs, or for cutting up, if there are any such.

[Detailed engravings of this board are published in the printed *Transactions* of the Society.—EDITOR.]

fixed above the windows and extending the length of the car. The pump which supplies the water to the strainers is fixed beneath the car floor and driven by power from one of the car axles, transmitted by means of a belt running from the axle to a pulley and crank which change the rotary motion to rectilinear motion. The belt is tight only when a roller at the end of a long movable arm rests upon it and the pump is stopped by raising this roller by means of a cord which passes through the bottom of the car directly over the roller. Most cars are found to have sufficient width be-

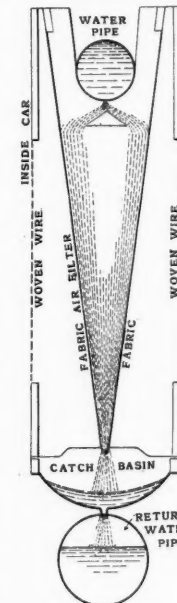


Fig. 1.

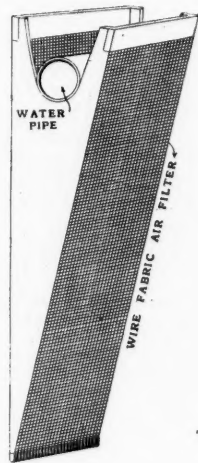


Fig. 2.

A Car Ventilating Apparatus.

tween the windows to enable the ventilators to be put in, the only thing necessary to remove being the braces, and it is said that the ventilators, properly fitted, give greater strength to the frame of a car than the removed brace. The pumping apparatus is entirely out of sight, and runs without perceptible noise.

This apparatus is being applied to some chair cars and a private car for the Texas Midland Railroad and the experiments thus far made with it have proved satisfactory. James B. Wilde is President and William L. Lee is Secretary of the Dustless Railway Coach Company.

The Czar in France.

The Parisian weekly, *L'Illustration*, devotes a whole number to "Our Guests," the Czar and Czarina, with exhaustive accounts of their lives, and their genealogies, their escutcheons and their yachts. From the confusion of all their gorgeousness we extract a few notes.

The Presidential Train.—This was built in 23 days by the *Société de Construction de Saint Denis*, a performance which truly breaks the record. It is made up of

seven coaches, each 18 meters (59 ft.) long, and two vans. The plans were made before the Czar had decided to use his own train in this French trip. This presidential train is divided into three parts—one for the imperial pair, the second for the President of the Republic and the third, the grand salon, for both parties. The imperial coach includes two staterooms for the Czar and the Czarina, with accommodations for their suites and a "salon cabinet" for work. The presidential coach has a long salon, a stateroom for M. Faure, and a bathroom. All the decorations and furniture, which are most complete, were furnished by the Messrs. Dieust, while the painted ceilings, which are spoken of as "extremely mediocre," are by M. Cavalé Coll. At all events, it was necessary for the President to have at his disposition a complete train, instead of being obliged to be contented with the private cars that the different companies put at his disposition. This was "a real want, which the visit of the Czar to France gave the occasion to fill."

This good-natured little account of what looks like an

scrubbing the top of a car and six more working on one side. This attention to the roof would make some of our American car cleaners turn up their noses.

The article on this imperial train is too long to reproduce here, but we learn from it that this train, of 11 cars, was built in Russia in 1892-'94, and that there are six more like it in Russia, beside the train that used to belong to Napoleon III., which the Russians seem to have acquired. The article takes pains to state that it takes three or four days to change the trucks under one of these trains to suit the west-of-Europe gage, which cannot be called excessively fast work. Each Russian car has two trucks of two axles each, while Napoleon's cars are the old three-axle style.

The article states also that "when the Czar travels in Russia a duplicate train with part of his suite is moved sometimes ahead of him and sometimes behind, the trains changing position frequently so that it is almost impossible to know which carries the sovereign." This precaution dates from the rise of the Nihilists.

York, running to Cleveland, Sandusky and Monroe. The steamers between Buffalo and Cleveland also landed every day at Dunkirk, taking passengers to and from intermediate places. Buffalo passengers could connect with the New York & Erie by way of Geneva, crossing Seneca Lake by "the new steamer Ben Loder." The lake steamers connected at various ports with the Cleveland, Columbus & Cincinnati Railroad, the Sandusky & Cincinnati, the Michigan Southern and the Michigan Central, also at Toledo with the Ohio and Indiana canals. The engineman of the principal train on the Western Division of the Erie road, the "night express," was Mr. Horatio G. Brooks, who was the founder of the Brooks Locomotive Works. We reproduce this old advertisement, so much reduced, however, that a good deal of the detail is lost in our engraving.

The Southern Railway Shops, near Salisbury, N.C.

The new shops just completed by the Southern Railway Company, near Salisbury, N. C., and the freight and shop yards connected therewith are an example of quick yet substantial construction. The contract for the buildings was let the latter part of March, 1896, and on Aug. 19 President Spencer and party, consisting of Vice-Presidents Andrews and Baldwin, Traffic Manager Culp and others, visited the works, steam was turned on, the machinery put in motion and actual work begun, and now everything is in full blast.

The buildings are constructed with steel frames resting on substantial masonry, have corrugated steel siding and slate roofs and are as follows: Roundhouse, with 15 stalls, 124 ft. inner radius and 194 ft. outer radius, with annexes for office and heater-room; machine shop, 100 ft. x 204 ft., with annexes for engine-room, toolroom and grinding-room; smith and boiler shop, 90 ft. x 204 ft., with office annex; wood-working shop, 90 ft. x 204 ft., with annexes for boiler-room, engine-room, shaving-tower and office; two repair sheds, each 50 ft. x 120 ft.; storehouse, 40 ft. x 150 ft., with 150 ft. platform at one end and 100 ft. platform at the other; also iron storage house, paint-house, oilhouse, sandhouse, crematory, transfer table, ashpit, coal bin and pumping station.

The freight yards are said to be the best in the South, although not the largest. They are arranged so that cars can be assorted by gravity, a switch engine being used only to start the car, which then takes the proper track and is stopped by a brakeman when desired. There are 11 parallel tracks in this yard, beside the incoming and out-going tracks, and the ground has been graded for 13 more, to be put in as necessity may require. The shop yards are arranged for convenience in handling cars in and about the shops.

The coal bin is 700 ft. long, 70 ft. wide, and 24 ft. high, and has now in it about 15,000 tons of coal for supplying road engines. Near it is an ash pit 120 ft. long, so arranged that the ashes from the engine are shoveled from the ash platform into a gondola or other car standing on a track alongside so constructed that the top of the car is on a level with the ash platform.

The water supply is from the Yadkin River, distant about three miles. Two pumps have been put in and in case of one breaking down the other can be used. At the shops there is a tank holding 60,000 gals., standing on a steel tower that is 60 ft. high. Hydrants have been placed at numerous points about the buildings and lumber yard, and hose procured, so that in case of fire water can be had quickly. Telephone connection has been made between the shops and the pumping station, so that the pressure of the pump can be used when necessary in case of fire.

The buildings are lighted by electricity and have been equipped with modern machinery of the most approved kinds; a few machines have been brought from other shops.

The shops are on a high ridge, 334 miles from Washington, giving a good view of the surrounding country. The adjoining property has been laid out in lots for homes for the employees of the company, although it is not the intention to do other with this part of the property than sell it to those who contemplate building.

The grading amounted to about 75,000 cu. yds., and was done by Lane Brothers, of Scottsville, Va. The steel frames for the buildings were made and erected by the Shiffler Bridge Co., of Pittsburgh, Pa. John P. Pettyjohn & Co., of Lynchburg, Va., were the contractors for the large buildings; W. W. Dorning, of the same place, did the plate and corrugated steel work. Benj. Thompson, Assistant Engineer of the Southern Railway, working under the supervision of Mr. C. H. Hudson, Chief Engineer, was in charge of the work.

Hydraulic Dredging Infringement.

A. B. Bowers, C. E., of San Francisco, inventor of a system of hydraulic dredging machinery, having obtained decrees in the United States courts sustaining his claims, has filed a bill of complaint against the American Dredging Company for a permanent injunction to prevent said company from further infringement of his patents. About a year ago this company built a large machine for the improvement of the harbor at Philadelphia and the reclaiming of Petty's Island and terminated its sub-contract with the Hydraulic Dredging Company, of which Frank C. Somers was Manager. This latter company then recognized the validity of the Bowers' patents and reorganized under the name of the Bowers Hydraulic Dredging Co., with extended jurisdiction. Suits are now pending against the San Francisco and New York Dredging Companies, Von Schmidt and others, with more to follow.

An Old Advertisement of the Erie Railroad.

imperial slight is illustrated by a picture of the President's coach—which, with its "Presidential escutcheon," looks much like a "Royal Blue Line" car. There are also pictures of the staterooms of the Czar and Czarina, showing couches with gorgeous upholstery, which puts Wagner's successors to shame; and of the "salon," whose painted ceilings—despite its "mediocrity"—should make Pullman weep with envy.

The Imperial Train.—In stern contrast to this is the imperial train, which it appears the Czar preferred. The picture of the Czar's coach shows it to be covered with rivets as if it were made of boiler plate, while the windows are very small. The interior finish is comparatively plain, though the walls and ceilings of the salon are covered with thick upholstery—perhaps to make things comfortable in case of an overturn. There are pictures also of the electric-lighting dynamos, with the boilers and engines which run them, of the repair shops and kitchen on the train, all with the booted Russians at work, and also a picture showing how the coaches are cleaned. This last shows four mujiks on their knees

The longest of the Czar's cars is 20 meters long, or about 65 ft. This contains the salon and dining-room, and also a sacred picture of St. Nicholas, which seems truly Russian. Twenty-six mechanics and porters travel with the train. Besides these 26 there are a major domo, four valets, four cooks and others.

A Railroad Poster of 1851.

Hanging in the offices of the Brooks Locomotive Works at Dunkirk, N. Y., is a poster such as formerly were used for the function now performed by the poster time-table, issued by the New York & Erie Railroad in 1851. As was customary at that time, the poster deals at much greater length with facts about connections than with the merits of the road that issued it. It advertises the route from New York, by Dunkirk, to Cleveland, Detroit, Chicago, Milwaukee, etc. At Dunkirk connection was made with "the splendid steamers Empire, Saratoga and Alabama," leaving Dunkirk every evening on the arrival of the day express from New



ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 22 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A striking instance of the fluctuation of traffic is given by the lumber shipments from the Saginaw River. We are accustomed in this country to witness prodigious growths of traffic, as new territories are developed, but this lumber movement is quite as remarkable in the opposite direction. The *Northwestern Lumberman* publishes a statement of the Saginaw River shipments for the season of navigation down to Oct. 1 for the last 27 years. They grew from 359 millions of feet in 1870 to 624 millions in 1880, averaged 600 millions per year for the six years ending with 1885, fell to 360 millions in 1888, and have been for the last eight years (in millions of feet):

1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
316	323	307	256	138	131	96	54

Thus the shipments this year were 43½ per cent. less than last year, 60 per cent. less than two years ago, only about one-fifth as great as in 1892, and not one-twelfth as great as in 1882, when the business culminated. A very large part of this stupendous decrease is due to a decrease of production; the "crop of logs," so to speak—a crop which required more than a hundred years to mature—has been for the most part harvested; but the production has not decreased in anything like the same proportion as the river shipments. More and more the lumber has been going to market by rail, and though the production in the Saginaw District this year is the smallest for 30 years, there is said to be now 600 millions of feet of lumber on the mill docks and in the yards on the river awaiting purchasers. More significant, perhaps, of the immediate condition of the lumber traffic is the decrease in shipments at Minneapolis for the nine months ending with September from 283 millions in 1895 to 210 this year—just about one-fourth.

Advices from our Western correspondents indicate that there is likely to be no trouble in advancing freight rates on November 2, as agreed upon. The heavy grain movement, stimulated by the advance in prices, will assist materially in bringing about a maintenance of rates for the present. Meetings of the executive officers have been held at Chicago this week, at which the action of the traffic officials in ordering the advance has been ratified, and it has been once more "agreed" to maintain rates and to continue to work under the present agreement of the Western Freight Association. Pending further developments, it is announced that the Atchison and the Rock Island have suspended their notices of withdrawal from this association. This result amounts to an admission that the presidents cannot yet agree upon any form of agreement which shall embody a penalty clause. It is stated that the old percentages for the distribution of traffic are to be continued in effect; which probably means that each road will get all the business it can, and that affairs will move along smoothly as long as there is freight enough to go around; but it will not be at all surprising (if the present increased movement of freight should drop off again) to see the same old difficulties encountered when it is again attempted to adjust

overs and shorts. In short, the present arrangement can be regarded only as a truce, and optimistic expressions, even from railroad presidents, must be regarded as resting on very temporary foundations. Every manager must, of course, if his vision is clear, still see the necessity of agreeing upon some line of concerted action which will restore the confidence of all the members of the Association. There is no permanence unless members believe that the spirit, as well as the letter, of the agreement will be lived up to. In the absence of any legal right to pool earnings, we can see no hope of accomplishing the desired harmony except by a radical change of plan.

The Managers of the Joint Traffic Association have recommended that the connections of the Toledo, St. Louis & Kansas City notify the Receiver of that road that they will not sell tickets over it nor honor tickets sold by it, after Oct. 22; and the newspapers say that Receiver Peirce will enter suit in the courts against the roads which "boycott" him. Whether he will base his complaint on the anti-trust act, or the interstate commerce law, or the real or supposed repugnancy of a boycott to the common law, does not appear. The managers say that they have convincing evidence that the "Clover Leaf" has cut rates on eastbound tickets and has given free chair-car permits to second-class passengers; and that such action "creates an unlawful and unjust discrimination against other lines." . . . They also say that the conduct of the road in this matter is contrary to agreement. As the "Clover Leaf" is not a member of the Joint Traffic Association this must refer to some former agreement, at St. Louis or Central Traffic territory. At first thought the Joint Traffic Association would seem to be here dealing with business not within its control; and indeed it is true that the main difficulty concerns traffic wholly west of Buffalo and Pittsburgh; but some of the through business passes to or from Eastern territory, and the intervention of the Association is, of course, legitimate. It was asked for by the old Joint Passenger Committee. In a controversy so difficult to deal with the roads more immediately concerned should be thankful that they have such a powerful organization as the Joint Traffic Association to take up their fight. The use of the terms "unlawful" and "unjust" in the resolution of the Managers is not exactly clear. In the eye of the law the injustice and illegality of rate reductions seems to be a crime against passengers rather than against competing railroads, although, of course, all unfair competition is unjust to every competitor whose conduct is not unfair. It is to be presumed, however, that the use of these terms indicates that the convincing evidence referred to is of a nature that could be successfully used against the accused road in the courts; so if Receiver Peirce enters a suit, this first attempt of the associated roads to force an outsider to come into line may result in some interesting developments in open court. Where interstate rate reductions, either in the shape of easy chairs which ought to be charged for, or in any other shape, are made without public notice they are illegal; and the Joint Traffic Managers, if they know of such transactions, might well appear in court as complainants rather than as defendants.

A Heat Test for Car Wheels.

When we wrote three weeks ago about the Pennsylvania Railroad Company's heat tests for car wheels we wrote not to express opinions or to give the result of accumulated knowledge, but to call out opinion on an important subject. Since that writing we have heard from a dozen car-wheel makers and have read the report of Mr. H. J. Small, Superintendent of Motive Power and Machinery of the Southern Pacific Company, which is published in the Report of the Proceedings of the Master Car Builders' Association for the year 1892; and still we do not feel that any great advance has been made in our knowledge of the subject.

Mr. Small made two sets of tests. In one of these car wheels were set up in a machine and run at 30 miles an hour for 45 minutes, subject to the pressure of an applied brakeshoe. Cast-iron shoes were first used, and, after failure to crack the wheels subjected to test with them, wrought-iron shoes were substituted and the test repeated. Temperatures were taken at the rim and at the hub at the end of each test. The retarding strains on the brakeshoes were measured and recorded. Another set of tests made by Mr. Small was with a heating apparatus. Oil was caused to circulate around the rim of the wheel and was burned as it escaped from numerous small holes in the pipes, thus heating the rim. In this case also temperatures of rim and hub were taken. The temperature of the hub was kept down by a current of water flowing through the core space.

The first series of tests with the brakeshoe machine was made on wheels cast by the Southern Pacific Company at Sacramento. Sixteen tests were made of ten pairs of wheels. From the tabulation we find that 62 per cent. of these broke, but they all appear to have run as long as 30 minutes, and most of them 45, the full limit of time of the test. The difference of temperature between rim and hub varied between 219 degrees minimum and 403 degrees maximum. The wheel showing the smallest difference was cracked.

Another series of tests was made on twenty-eight foreign wheels, including twenty-four different makes. Of these something more than 50 per cent. broke. The difference of temperature in this case ran from 180 degrees to 439, and the lowest time of endurance recorded was twenty-six minutes.

There seem to have been but five tests made with the apparatus for heating the rim by burning oil. Out of these five wheels four were cracked in the outside plate. The difference of recorded temperatures in these four wheels ran from 288 deg. up to 484 and the time of endurance from 30 minutes to 40. The one wheel which did not crack lived 40 minutes, and the difference of temperature between rim and hub rose to 650 deg.

In the Pennsylvania tests the wheels have been broken in very much shorter times than in the test made by Mr. Small: that it, they begin breaking in less than a minute and most of the fractures occur before four minutes. In fact if the wheel stands four minutes it probably will not break at all. We have been informed that in the specifications which the Pennsylvania Railroad Company will send out two minutes will be fixed as the time which a wheel must endure this test.

It is obvious that the Pennsylvania test is immensely more severe than those applied by Mr. Small. At Altoona a mass of molten iron, an inch and a half thick and deep enough to completely cover the rim of the wheel, is suddenly poured around the wheel. Of course the rise of temperature is many times more rapid than in the tests made by Mr. Small and the temperature of the rim rises higher and the difference in temperature between the rim and hub is much greater. Indeed, one car-wheel maker with whom we have talked on the subject considers the Altoona test severe to the degree of cruelty. He himself has made similar tests, pouring, however, only half an inch of melted iron around the rim of the wheel. It is very obvious that the use of so large a mass of melted metal will heat the rim with far greater rapidity and to a much higher temperature and will cause a greater difference of temperature than would be the case under the brakeshoe in practice. But, on the other hand, the equilibrium of justice may possibly be restored by fixing two minutes, or some other very short time, as the limit of time that the wheel must endure this test.

The position of the car-wheel makers in this matter is still what might be called tentative; they want to wait and see and learn before expressing themselves very definitely as to the desirability or utility of such tests. Of those from whom we have heard, five have tried similar tests, or will try them. We suspect that others than these five will make such tests for their own information. Indeed, if the Pennsylvania scheme is carried out the makers will be obliged to make heat tests in order to regulate the quality of material used and the process of manufacture in such a way as to produce wheels that will stand the test.

One of the oldest car wheel makers says that "from present indications the form of pattern has about as much influence upon the result as the quality of material used." This seemed to be the conclusion from Mr. Small's investigations. He paid particular attention to the pattern and brought out a design classified in his report as the JN wheel. This wheel had 13 small brackets of the S shape, ⅝-in. inside plates and ⅝-in. outside plates, the latter being quite concave; and he found this design to endure the effects of the heat test better than what he had previously used, and at the time of writing his report he says: "3,500 wheels from these patterns have been put under passenger cars and but one JN wheel has been removed on account of cracked plate, and a careful investigation of this wheel revealed the cause to be dirty iron in the outside plate."

Of the makers from whom we have heard three say without qualification that the heat test would be a useful one. One of them says, "I am inclined to think that the test would have a very decided influence in determining the shape and pattern and the quality of material. The test is somewhat severe, but it is possibly the best method of determining the relative safety of wheels that has yet been devised." No other maker is quite so positive in his opinion as this one: but as we say, three of them are of the opinion that the tests will be useful. Most makers

consider this largely a question of price. If they get money enough for their wheels they can make wheels that will endure this kind of test. We have heard from but two wheel-makers who are unqualifiedly of the opinion that these tests are useless, although another one says, "It would be well to follow up the line of experiment. I do not much think it would be of sufficient value to displace the present method of testing. My present impression is that it is an unnecessary complication." It will be observed that he is not so positive in his opinion but that he would recommend carrying these experiments further.

On the whole, the sum of the present situation is that the Altoona trial tests do not represent service conditions accurately, but neither does the drop test. A wheel can be made to stand a good drop test and still break easily under the heating of the brakeshoe. The drop test and the heat test together will insure certain necessary conditions that can be obtained by proper patterns, mixtures and treatment. The question seems to be merely whether or not the railroad companies can pay for all these conditions. The wheel-makers have for years been saying that unscrupulous men have reduced the selling price below the figure at which good wheels can be made. Will it not be a good thing for the trade to make a set of requirements that will put pot metal wheels out of the market, or in a class by themselves where they will not be confounded with the reliable wheels?

Fuel Loss Due to Forcing Locomotives.

II.

Professor Goss in his first series of tests, the results of which are given by diagrams Figs. 1 and 2, stuck to practical conditions; that is, took a given boiler and without change shoveled more coal into the firebox per minute just as is done in service, with the result that is shown on Fig. 2; namely, a loss of 40 per cent.

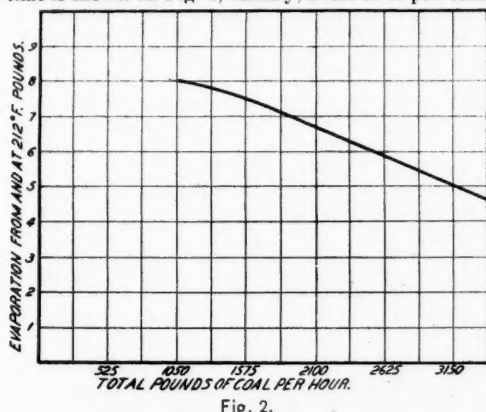


Fig. 2.

within the limits now being talked about. In the second series he did nothing of the sort, but took a boiler and changed it in a way that is never done in service, and so has obtained results which to us appear of great practical value only in the single element of the amount of sparks produced. The matter of evaporation of water must have been so modified by the change in the ratio of the grate to heating surface, and the location of the grate in respect to the heating surface, that abnormal results appear to have been unavoidable. Taking diagram Fig. 2 and plotting thereon the results of Professor Goss' second series, it is found that they all appear on practically the same vertical line and at about the least amount of fuel used per hour. The circles, Fig. 4, show the results.

It is seen that the amount of fuel used in the sec-

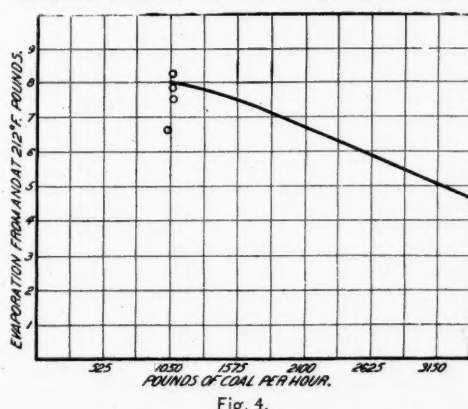


Fig. 4.

ond series of tests per hour is about the smallest amount used by the locomotive in regular service, and most of the losses that arise in service from the real forcing of the heating surfaces do not take place, nor are they wholly eliminated. Professor Goss, it is true, does touch upon this point, but he leaves us to understand that the second series of tests indicates

two things: the relative value of large and small grates and the variation in efficiency due to a change in the rate of combustion per square foot of grate, independent of a change in heating surface. There are several reasons why such conclusions cannot be drawn from the results, but we shall only draw attention to one of these here.

The normal firebox and boiler is shown by Fig. 5. When this is in operation the entire box is filled with

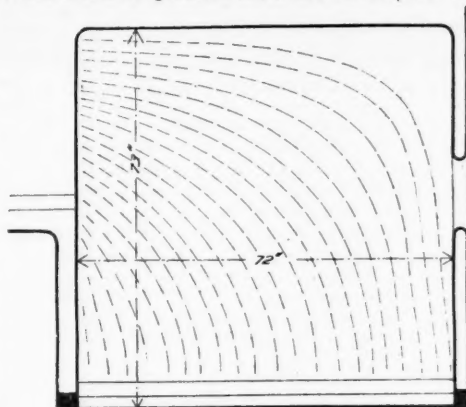


Fig. 5.

hot gases and flames at all times and for all the different rates of combustion. Each firebox sheet is doing effective work in absorbing heat by direct radiation and by contact with the flames. This represents a condition which was present in all of the first series of tests, results of which are given on diagrams, Figs. 1 and 2.

Fig. 6, 7 and 8 show how different were the conditions in the second series of tests and how the heat-

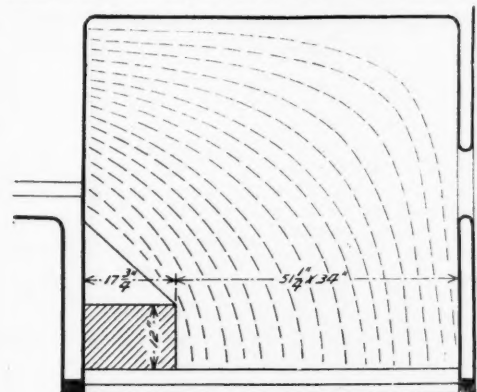


Fig. 6.

ing surfaces were removed from the fire and thus rendered less efficient, or at least changed in the relation to the operation of combustion. The possibility of the mixing of the gases in the firebox before reaching the tubes is changed, and this, taken together with the important fact that the lowest total

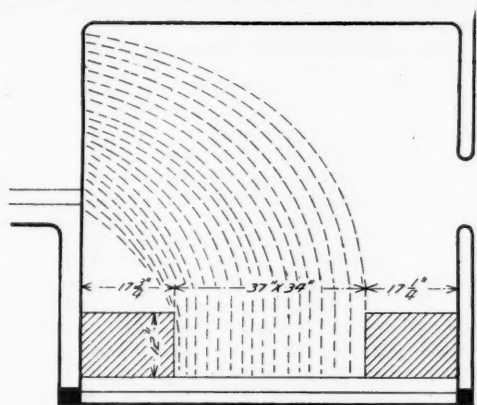


Fig. 7.

amount of fuel used per hour in service was chosen, instead of an average one, makes it necessary to hesitate before accepting Professor Goss' second series of tests as showing anything more than the spark losses in a way that will permit a safe conclusion about normal locomotive operation. What he shows is that a small and constant amount of fuel burned at a varying rate per hour in a boiler that does not represent a real locomotive boiler gives results that indicate a loss of but 5 per cent. outside of the increased spark losses when the rate of combustion is changed from 60 to 200 pounds per square foot of grate per hour. This may be so, but that it tells us what will result from normal conditions, we cannot believe without further evidence.

Leaving aside the direct effect of the losses arising from forcing a locomotive boiler on the economy of the locomotive, and its bearing on the question of large vs. small grates, there is an important indirect

effect which must be reckoned with; namely, the loss arising from the inefficient means of blowing the fires, by back-pressure in the locomotive cylinders. Those familiar with the action of locomotives know that back-pressure is one of the principal losses in over-worked locomotives and is difficult to reduce. So far as we know now the first step in the reduction of the back-pressure, and one that should be taken with every locomotive, is putting the smoke-box and draft apparatus in the best possible condition. Perhaps there is no better way to do this than to follow the recommendations of the Committee of the Master Mechanics' Association.

The next step is an increase in the grate area. Only those will feel inclined to dispute this who have had no experience with large grate engines. However, not much experience is required to get a conviction in the matter; a little careful observation will answer. Let one stand at a local station on the Reading road and hear one of their large grate engines pass through

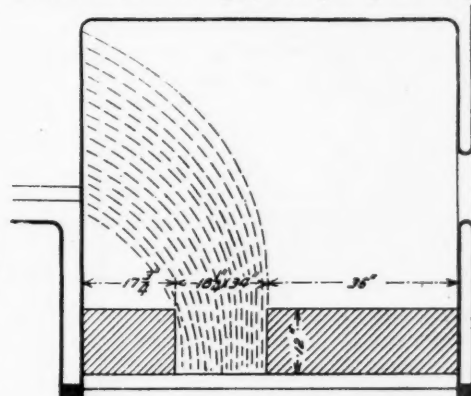


Fig. 8.

with a heavy train, and he will be surprised, if unfamiliar with the condition, at the small amount of the noise made by the blast when compared with small grate locomotives under the same conditions. Further, if it should happen that this large grate locomotive be one of the Vaucain compounds, the noise of the blast will hardly be discernible. Take the Vaucain compound, large-grate, passenger engines on the same road when pulling 10 cars, and one can hardly hear the sound of the exhaust in the cab. Much of this reduction in noise and consequent decrease of back-pressure may be due to the compounding, but a good proportion of it arises from the larger grate, which needs only a soft, gentle blast, instead of a tearing one, to burn enough fuel per hour to keep the locomotive going.

Perhaps the loss due to back-pressure is the largest of all losses arising from working locomotive cylinders very hard, and probably it is this loss which modifies so completely the otherwise to-be-expected uniform decrease of efficiency when locomotive cylinders are over-worked. Illustration of this is found in the results presented by Professor Goss to the May, meeting of the Western Railway Club, and in the diagram accompanying Mr. Barnes' communication to the September meeting when the matter was discussed.

Fig. 9 is Mr. Barnes' diagram of the results presented by Professor Goss, and shows how, even at 135

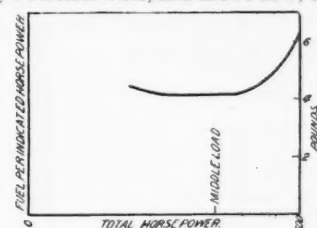


Fig. 9.

revolutions, a 10-in. cut-off increases the fuel used per indicated horse power, taking into account the cylinders only and not the boiler. No doubt this increase comes largely from back-pressure. Taking Mr. Barnes' second diagram, Fig. 10, herewith, it is seen that the efficiency falls rapidly when the cylinders are pushed above a middle load.

To show the boiler efficiency with the cylinder efficiency given in Fig. 10 ought to be interesting. This is given by Fig. 11, in which the point C is made to correspond with a rate of combustion of 130 pounds per square foot of grate per hour, taken from Fig. 1. This 130 pounds is for the purpose of a rough comparison taken as the "middle load"; it may or may not be so, but for all purposes of this comparison it is quite accurate enough to assume that it is.

We now see that the locomotive boiler, when forced above what may be taken as the middle load, does not waste fuel so fast as the cylinders do when forced;

and having tacitly agreed that the loss in the cylinders is largely due to the back pressure, it looks as if the large grate would produce more saving by reduction of back-pressure in the cylinders than by an increase in the efficiency of the boiler itself.

It would be unfair and unwise to intimate that the results given by Professor Goss are not useful, instructive and in a line with the work which ought to be

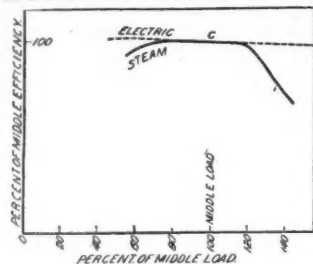


Fig. 10.

done for locomotives, but it would be unsafe, as well as unwise, not to scan closely all conclusions drawn from the results of any series of tests of such an old, complicated well-tried mechanism as a locomotive. In this series of results Professor Goss has given us some good testimony about the value of large grates and what we want is more of it, not less. The work has been done faithfully and conscientiously, and while it is not complete enough for general conclusions, yet it forms an important part of a foundation for deductions.

If an error be made in the design of the locomotive by which the grate area is made too small, or if the locomotive be inadequate for the work to be done, a substantial loss from forcing the boiler must be expected. This is not to say that all locomotives having small grates are necessarily badly designed, nor

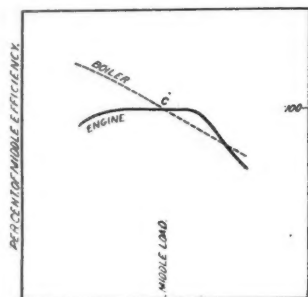


Fig. 11.

does it mean that no railroad company is justified in pushing fires until such a large loss of boiler efficiency results; for large grates are only needed when the work is heavy, and it is often better to have a small grate pushed occasionally than to have so large a grate as to give the fireman increased work at all times to keep the large grate properly covered. It is only by keeping the fire in good condition on the large grate that the advantage of a lower rate of combustion per square foot of grate per hour can be obtained. Clearly there are many practical matters closely connected with the actual service which must be taken into account in selecting a proper grate area, but the fact remains that efficiency of the locomotive as a steam engine and boiler plant is far higher with a large than with a small grate area.

Some of the Effects of the Advance in Cereals.

The low point of the stock market was reached Aug. 8; just one month later the prices of grain and provisions touched their minimum figures—some of which broke the record. The improvement that followed, up to and including Monday of this week, amounted to 22 cents per bushel in wheat, 4½ cents in oats, \$2.83 per barrel in pork, 85 cents in ribs, \$1.32½ in lard, 1½ cents in tallow, 1 cent in mess pork, 7 cents in corn and rye and 10 cents in flaxseed. These gains followed the lead of wheat and were in response to a heavy European demand that developed on the certainty of a shortage in the Argentine and Russian wheat crops and a very serious failure of the crop in India. As foreigners were the first to realize the conditions they, together with the farmers, are reaping the big profits.

The statement has been made that the advance thus far has been manipulated and that it will shortly collapse. The facts in the case do not bear out this view. Wheat, and to a lesser extent other grains, have been bought for consumption, largely by foreigners. Large amounts have gone abroad, and a heavy tonnage is now waiting for freight room. The receipts of spring and winter wheat at various commercial centers from July 1 to Saturday last aggregated 77,294,000 bushels, a gain over the corresponding period of 1895 of 13,518,000 bushels. This heavy increase in the receipts would certainly have checked an advance in a manipulated market long before this. The facts that every foreign wheat center has

been buying steadily, and that there has been no effort to "realize" indicate the bona fide nature of transactions which underlie the market and foreshadow still higher prices.

The failure of the Indian crop is of course a very important factor in the situation. India, instead of exporting largely, is actually buying wheat from the United States. From April 1st to date, it (India) exported to Europe only about 3¼ million bushels against exports in the corresponding period of 1895, of 15½ million bushels. Shipments direct to India from the Pacific coast have recently been made in some volume, and we believe it is 20 years since India has bought any of our wheat. Ship room has been engaged out of San Francisco months ahead, as is also the case at Atlantic and Gulf ports. Baltimore and Norfolk report an advance of 2 cents per bushel in freights within a few weeks. During September the United States excess of merchandise exports over imports was \$34,294,133. During that month the exports of breadstuffs increased \$5,933,675 over the corresponding time in 1895. During two weeks in October, shipments of breadstuffs, flour included, were 4,203,845 bushels against 3,510,371 bushels the year before. Should the exports continue in present volume they will exceed the record-breaking months of the last quarter of 1891.

The effects of these appreciations in food products are numerous and far-reaching. The amount of wealth that has been created for the country thereby is roughly estimated at half a billion dollars. There is no way in which it can be more than approximated. Taking the Government's figures as to the probable 1896 yield of leading cereals we find that the 412 million bushels of wheat which has appreciated 22 cents, will return holders 90½ million dollars more than it would at the lower value. In like manner the 2¼ billion bushels of corn increased 158 million dollars through an advance of 7 cents per bushel and the 670 million bushels of oats \$30,000,000, a total of 278 million dollars. There is not a farm product that has not improved. The advance in pork and beef about offsets the increase in price of corn, so that the farmer stands to realize a portion of the appreciation in one form or other.

In direct benefit the farmer will evidently profit to the greatest extent. The major portion of his 1896 crop had not been sold when the advance started; he had also considerable of the 1895 crop. Most of the grain shipped since July has moved at greatly reduced tariffs. At present all of the roads running into the commercial centers, and especially the great collecting and distributing center of Chicago, are actually choked with traffic. Last week the receipts at Chicago of all grains, including flaxseed, aggregated, the almost unprecedented figure of 12,682,000 bushels. This was an increase over the previous week of 5,194,000 bushels, and over the corresponding week of last year of 5,510,000 bushels. Over the very dull year of 1894 the gain was 10,516,000 bushels. It is little wonder that the roads have agreed to restore their rates.

The increase in the purchasing power of the farmer is already being felt in trade centers. The movement of westbound freight has been steadily increasing and is now of fair volume. When once the farmers start to buy supplies the first distinct step in an industrial revival will have been taken. Supplies in first, second and third hands are far below requirements, and when the demand comes we may believe that it will be with a rush.

The bearing of the appreciations on the trade balance is obvious. We have seen the import of something like \$60,000,000 gold from Europe at a time when the Government reserve was threatened by a raid from hoarders, and when Eastern bankers were straining every nerve to bolster up confidence. Sterling exchange at the time of writing is 4.80½ for sixty-day bills and 4.83 for demand. The latter quotation is from ¼ to ½ of a cent below the gold importing point, and it indicates the genuine character of the gold movement.

As a campaign factor the 22-cent advance in wheat is a terrible blow to silver. The farmer has been told that the demonetization of silver was the direct cause of the decline in wheat. Since Mr. Bryan and Senator Jones began talking this summer silver has declined 5 cents an ounce and wheat has gone up 22 cents a bushel. When cereals began their advance the Popocrats abandoned the wheat-silver theory and devoted their energies in crying down Lombard street. They also had a good deal to say about the "declaration of independence of 1896," the ability of this country to prosper without aid, association or trade with other nations, etc. They quite forgot to say that the advance in wheat was the direct result of a demand almost strictly foreign in its nature. These are a few of the factors which have opened the eyes of the farmer and caused him to wonder what there is in his make-up or record that warrants such attempts at deceit.

The Popocratic candidate, when he has time to think, is likely to discover the irony of fate in this movement of wheat and silver. Instead of the low price of silver pulling down wheat, the high price of wheat has pulled down silver, and in just this way: India, instead of being an exporter, has been an importer of wheat, and consequently has paid out instead of receiving silver. The result has been a stoppage of the London demand on this country for India shipment, and a heavy unloading of rupee paper, accumulated with an idea of speculating on the growth of the silver sentiment in the United States.

Annual Reports.

Illinois Central.—The report for 1896 shows the largest earnings and heaviest traffic movement of any year in the history of the company without exception. As compared with 1895, which was not an unfavorable year for the company in net results, gross receipts from traffic increased 15.4 per cent. and net receipts increased 21.6 per cent. Average mileage operated increased 6.2 per cent. by the acquisition of the St. Louis, Alton & Terre Haute, 239 miles, whose operations are included for nine months of the year. The operations of the other lines which have been added to the Illinois Central lines in recent years, the Yazoo & Mississippi Valley, 807 miles, and the Chesapeake, Ohio & Southwestern, 456 miles, are not included in this report. The general results for three years are summarized below:

	1896.	1895.	1894.
Gross earn.....	\$22,002,842	\$19,056,994	\$20,657,464
Oper. exp.....	14,962,276	13,268,531	14,369,415
Net earn.....	\$7,040,567	\$5,788,463	\$6,288,048
Total receipts.....	8,959,030	7,430,905	8,194,493
P. c. exp. to earn.....	68	69.6	69.5

In 1896, the fund available for fixed charges and dividends was \$9,779,216. The total deductions for fixed charges and rentals were \$5,873,305; for dividends, \$2,502,500. Out of the surplus remaining, \$422,500 was set aside for betterments during the coming fiscal year and the final surplus on the year's operation was over \$100,000.

President Fish summarizes the position of the company at the end of the year as follows: "After the usual payment of \$10,000 of bonds through the sinking fund, and increasing the surplus dividend fund by \$100,725, the Cairo Bridge Fund by \$43,723, the fund for the redemption of the Western Lines first mortgage bonds at their maturity by \$47,883, the insurance fund by \$78,191, and after purchasing 45 new engines to replace old ones at a cost of \$453,798, the receipts of the year have sufficed for the payment of the usual 5 per cent dividend, and have enabled the directors to set apart to provide for future betterments the sum of \$422,500."

The increase in gross earnings over 1895 was \$2,945,848, but about one million dollars of this was due to the nine-month earnings of the St. Louis, Alton & Terre Haute included in the report. Deducting this amount the increase is still \$1,927,000, or over 10 per cent. more than the same mileage earned in 1895 and with this deduction the earnings are still in excess of any other year.

Freight earnings were over 15 million dollars, an increase of \$2,206,893, or 17 per cent. over 1895. Passenger revenue was \$4,394,771, or \$486,000 (12.4) per cent. greater than in 1895, but still far below the earnings in the World's Fair year, when earnings from this traffic were swelled to over six million dollars. There were increases in almost all other class of revenue, 7 per cent. in mail and 5.6 per cent. in express. Track rentals increased 5.6 per cent. also.

A few figures, giving returns per mile of road, will be interesting:

	1896.	1895.	1894.	1893.
Freight earn.....	\$4,899	\$4,439	\$4,242	\$4,125
Pass. earn.....	1,845	1,762	2,118	1,781
Total gross earn.....	7,173	6,598	7,152	6,957
Oper. exp.....	4,535	4,237	4,603	4,591
Net earn.....	2,638	2,361	2,549	2,367

As compared with the previous year the increase in gross earnings per mile of road was \$574, and in net earnings per mile, \$297.

The operating expenses show large increases in every item, except trackage and switching. Maintenance of way and structures were over three million dollars, \$638,000 (25.1 per cent.) more than in 1895. Maintenance of equipment expenses were \$2,556,000, an increase of \$380,380 (17.4 per cent.).

The charges to capital during the year were \$2,414,000, all but about \$300,000 of this sum being expended on the Illinois Central proper. This sum included \$791,000 for 1,600 box cars; \$84,196 for 200 furniture cars; \$9,435 for 15 caboose cars and \$77,374 for new shop machinery and tools, the total expenditures for equipment being \$1,103,487. Other important expenditures during the year were \$301,000 on the lake-front improvement at Chicago; \$61,000, for sidings; \$360,000, for buildings; \$122,000, for station grounds and about \$83,000 for new second track work. The new car shops at Burnside were completed in February, 1896, and President Fish states that the work now done, particularly in maintaining passenger equipment, is very perceptible. The capital stock outstanding is now \$52,500,000, having been increased by 2½ million dollars during the year, that amount of stock of the new issue of \$10,000,000, authorized by the stockholders in November, 1895, having been sold. The funded debt has been increased \$7,432,925 and the total funded debt now stands at \$77,504,925. During the year many events of large importance to the future of the property have taken place. The St. Louis, Alton & Terre Haute and its subsidiary companies were leased in October. The acquisition of this line gave the Illinois Central an independent entrance from the south into St. Louis and valuable terminal property in East St. Louis, and is of particular importance as giving the company its own line between its southern lines and the Chesapeake, Ohio & Southwestern and the Yazoo & Mississippi Valley roads, which is growing and must continue to pass over the St. Louis, Alton & Terre Haute, so that the lease promises to be profitable in itself besides strengthening the whole system. Running rights have been secured over the Big Four tracks from Pana, Ill., to East St. Louis, 65 miles. The Chesapeake, Ohio & South-

western was formally transferred to the Illinois Central during the year, having been sold under foreclosure of the second mortgage bonds in July last when the United States Supreme Court decided against the Louisville & Nashville in the suit brought by the state of Kentucky to prohibit the purchase of the road by that company. The long standing controversy with the city of Chicago in regard to the lake front property of the company in that city was settled amicably. The tracks are now being depressed part of the way between Randolph street and Lake Park place under the agreement made with the city officers, and viaducts are being built to give access from the west side of the tracks to the park being laid out on the lake front. The cost of this work is estimated at \$1,150,000, of which \$301,000 was spent in 1895.

The various complaints about blacklists, which labor agitators are always bringing up, when they lack more promising grievances, generally refute themselves; for the reporters who believe them—or who pretend to—never present a bit of evidence which carries any weight with people whose opinions are of any value, either to complainers or to anyone else. But we are glad, nevertheless, that a prominent railroad officer has spoken on the subject in unequivocal terms. The speaker is Mr. B. Thomas, Chairman of the Chicago General Managers' Association, the very body which has been most loudly accused of pursuing an oppressive policy toward employees, and he says:

"I am surprised to find there are still people who appear to think that railroads are in the habit of furnishing one another with lists of discharged employees, with the understanding that none of them are to be employed. I have been in railroad service for more than thirty years, and I never received such a list, never sent one out, never saw one, and do not believe there is such a thing in existence. The blacklist exists only in the imagination and has no foundation in fact."

It would be impossible to doubt the substantial accuracy of this statement, even if it came from an officer less trustworthy than Mr. Thomas, for it is confirmed by a very little reasoning from the nature of the case. As we have had occasion to show before now, a railroad superintendent has other and better means of getting information about any particular applicant for employment. In these times of superabundance in the labor market the mere absence of a letter of recommendation is generally a sufficiently black mark against any stranger who says he has had extensive experience. If any deserving trainman is really at a loss to know why he finds it hard to get employment he should inquire what kind of men *do* get the places. He will find that new men are picked from the farms or from other sources near by; the sons of old employees, for instance. The rule to select from these sources is coming more and more into favor with superintendents everywhere. Three years ago a Scotch railroad officer in Edinburgh told us that his best recruits were from among the "plough-boys." They were more temperate, industrious and teachable, and had sounder nervous systems than the town-bred boys. The same is doubtless true here. Again, railroad men out of work may note that the same difficulty is experienced in the higher ranks. Officers, as well as men in the rank and file, find it difficult to get back if they once get out of the railroad service. In the upper grades outsiders have small chance because the rule to promote within the ranks is more rigidly observed; in the lower ranks they are kept out by the very general feeling among superintendents, that the most efficient body of men is a home-trained body. A manager finds his orders most thoroughly carried out by men whom he has himself educated.

A correspondent in Maine has sent us 26 posters issued by the Maine Central during the past summer to advertise excursions, evidently a complete collection. The most noticeable thing about them is the evidence they give that Maine, though down East is right up to date. General Passenger Agent Boothby knows the art of advertising, and his "flyers" contain all the attractive features that one would find in the West, or anywhere else. By all, we mean all that are in good taste. The method of setting forth the attractions is almost uniformly commendable, though we are somewhat surprised to see a camp-meeting resort like Old Orchard Beach spoken of as desirable because the country visitor may there on Sunday afternoon see people in "every variety of Bathing Costume," the last two words being in big display type. The description of the view from Mount Washington is also subject to criticism for being too much like that of the view from Pike's Peak, which represented the scene as being bounded by the City of Mexico on the south, the north pole on the north, Pittsburgh on the east and (we believe) the Sandwich Islands on the west. The Maine Central evidently has given the people of its territory all the different kinds of excursions that they could make use of; one-day, three-day, weekly for the season, Saturday to Monday and so on. The writer of the advertisements seems to have used his own brains, where necessary, to supplement those of the managers of the "events" to which he made reduced rates; that is, he advertised their attractions better than they themselves did it. The lowest rate per mile that we see in these advertisements is $7\frac{1}{2}$ mills, a one-day excursion from New Hampshire towns to Portland.

A meeting has been called, to be held at St. Louis, Nov. 10, to consider the renewal for another year of the Western Pass agreement, and it is probable that it will

be continued in effect for another year. When this agreement was first made two years ago, we expressed doubts as to its usefulness. The agreement as then made proved weak in many spots but it was materially strengthened a year ago, since which time it has, we are informed, worked to the satisfaction of all the members and has undoubtedly proved of considerable use in restricting and regulating the issuance of passes to many persons who are either directly or indirectly in position to influence the routing of traffic. The existence of the agreement tends to allay suspicion on the part of the roads that their competitors are resorting to evasive practices. Commissioner Midgley deserves much credit for the success of this agreement.

TRADE CATALOGUES.

Pressed-Steel Brakeshoes.—The Schoen Brake-shoe Co., Betz Building, Philadelphia, Pa., sends us a little pamphlet describing the virtues of the Schoen pressed-steel brake-shoes. It is claimed that a saving of not less than 40 per cent. can be made in the cost of brake-shoes and that one of these low-carbon mild-steel shoes will outwear 10, cast-iron shoes and give the greatest holding power. These shoes are forged by hydraulic pressure into the exact forms now in general use and can be made of a very soft low-carbon steel. The shoes take hold immediately when brought to bear on the wheel and continue to hold with a nearly uniform retarding power, because they do not absorb heat as rapidly as the cast-iron shoes, and thus they are more effective.

TECHNICAL.

Manufacturing and Business.

The following summary of work now under way in the structural department of the Maryland Steel Co., at Sparrow's Point, Md., furnishes an interesting and somewhat unusual record for these times. The company is now furnishing the columns and girders for the Gillender Building, and columns for New York Life Building and Appraiser's Stores of New York City. It has nearly completed the steel work for the train shed for the Mount Royal Station for the Baltimore & Ohio at Baltimore, and is just completing the steel work for the Medico-Chirurgical Hospital at Philadelphia and the Newark Technical School at Newark, N. J. The steel work for a manufacturing plant for the Slaymaker-Barry Company, at Connelville, Pa., a 123-ft. rail bridge span for the Baltimore & Lehigh Railroad, and two plate girder spans for the Southern Railway have just been completed. Another span, 128 ft. in length, is now being erected. In addition, the company has in hand the steel structural work for the Pioneer Storage Building, Brooklyn, the Gate of Heaven Church, Boston, and the contract for a large bridge at New Bedford, Mass., the approximate weight of which it is expected will reach about 1,500 tons.

Mr. Frank B. Stone, Fisher Building, Chicago, has just received an order for 50,000 California redwood ties, to be shipped to Mexico.

The Edward P. Allis Co., Milwaukee, has received an order from a large iron furnace company of Trieste, Austria, for two vertical compound blowing engines of the largest type. These engines will weigh 300 tons each. The company has also received orders for two triple expansion vertical pumping engines for St. Louis, which are similar to the six engines now being specified by the city of Chicago for the extension of its water-works system.

The Berlin Iron Bridge Co., of East Berlin, Conn., reports its plant fairly well employed. At no time during the year have the shops been run on short hours, and they are now employing 400 men, running 10 hours six days a week. Present contracts will keep the plant employed on full time for the next two months, mostly on small work. Some of these may be mentioned as follows: Fireproof power plant and also a new dye house at Middletown, Conn.; a steel framework for the fire department building at Worcester, Mass.; power station for the electrical equipment of the N. Y., N. H. & H. R. R. at Stamford, Conn.; machine shop for the Baush & Harris Machine Tool Co., of Holyoke, Mass.; new steel bridge for the town of Green, Me., including a second bridge for the Cabot Manufacturing Co. at Brunswick, Me., and smaller bridges at Auburn, Pembroke, Turner, Buckfield and Bridgeton, Me.; a new iron roof for Randolph & Clowes, Waterbury, Conn.; a steel bridge for Somerset County, N. J., besides other smaller contracts.

At a recent meeting of the Board of Directors of the Bloomsburg Car Manufacturing Co., Bloomsburg, Pa., Mr. L. S. Wintersteen was elected President, the former President, Mr. G. M. Lockard, having sold his interest to Mr. Wintersteen. It is stated that the works are now busy, filling orders for Japan and South America.

Iron and Steel.

A committee of bondholders of the West Superior Iron & Steel Co. has been organized, and will endeavor to obtain control of the property in order that it may be reorganized and put on a paying basis. John D. Rockefeller is one of the heaviest bondholders. The greater part of the stock of the company is owned by the Land & River Improvement Co. A proposition made by the bondholders to settle with the creditors and take full possession of the property is opposed by the Improvement company in its capacity of stockholder.

The plant of the Pottstown Iron Co. has passed into the hands of George B. Lessig, President of the Ellis &

Lessig Steel & Iron Co., after being in the hands of receivers for several years. Mr. Lessig acquires a bill of sale of the personal property, inventoried at \$333,000, and leases the real estate of the company. The property includes the steel plant, a blast furnace, the Universal mill, three plate mills, one sheet mill, two puddle mills, a nail factory and a number of dwellings.

The Atlantic Iron & Steel Works, Newcastle, Pa., have resumed operations in all departments. The Greenville mill of the same company is also running, and it is hoped that the Sharon mill will resume in a few months.

The Kentucky & Alabama Coal, Iron & Land Co., Louisville, Ky., has been organized and officers elected as follows: W. J. Ijams, President; John H. Weller, Vice President, and S. E. Meyer, Secretary and Treasurer.

The Bethlehem Iron Co. has been notified that the test plates for the turret of the Russian vessel Rostislav have successfully withstood the tests made by bombardment by big projectiles, and that the group has been accepted by the Russian government officials. The plates are 8 in. thick.

The report that the plant of the Cambria Iron Co., Johnstown, Pa., had closed down for an indefinite period has been denied. The plant resumed operations, though not on full capacity, on Oct. 12.

The Buhl Steel Co., Limited, of Sharon, Pa., has given a contract to Alex. Laughlin & Co., Pittsburgh, for the erection of six 30-ton open-hearth furnaces, two soaking pits and the necessary producers to run them.

New Stations and Shops.

The Grand Trunk will erect a new depot at Berlin, Ont., plans for which are being prepared by Chief Engineer Hobson.

Foundations have been completed at London, Ont., for the new shop plant which the Grand Trunk is to erect at that point. The buildings are to be of modern type and their equipment of improved tools and machines. The buildings are to be as follows: Passenger car shop, 238 ft. x 80 ft.; paint and varnish shop, 238 ft. x 80 ft.; cabinet shops, 60 ft. x 80 ft.; wood-working shop, 275 ft. x 80 ft.; freight car truck shop, 536 ft. x 80 ft.; blacksmith's iron, machine and wheel shop, 237 ft. x 80 ft.; tinsmith's shop, 125 ft. x 32 ft. 6 in.; upholsterers', 125 ft. x 32 ft. 6 in.; oil and paint shop, 115 ft. x 32 ft. 6 in.; dry lumber house, 300 ft. x 50 ft.; fire engine house, 30 ft. x 32 ft. 6 in. In addition to these buildings, scrap sheds, dry kilns, stores and offices will be erected; the whole have a total floor area of 165,000 superficial feet. The walls will be built of light colored brick, and the roofs of slate. A special feature has been made of the arrangements for light and ventilation.

The Atlantic & Danville is fitting up shops at Lawrenceville, Brunswick County, Va., which are expected to be completed shortly. They will give employment to 100 men, and will be equipped with modern machinery.

The new Baltimore & Ohio car shop shortly to be erected at Keyser, W. Va., will be built entirely of iron, 500 ft. long by 85 ft. wide, constituting a wing to the present shops and will employ over 200 men.

Pumps Run Without Oil.

The pumps for torpedo boat No. 6, which is being built for the United States Government by the Hereschoffs, and which was launched on Sept. 9, have been supplied by the Geo. F. Blake Mfg. Co. These pumps have been so designed that they can be run without the use of oil, and under test they have been found to work satisfactorily. They are arranged with piston steam valves, very carefully and accurately fitted. In order to insure good working, these pumps must be started from the beginning without oil and worked until a glassy surface is obtained on the faces of the valves and ports.

The Electric Headlight on Crooked Roads.

The merits of the electric headlight have long since been made familiar to the readers of the *Railroad Gazette*. Besides the main function of the light—to illuminate the road for the runner of the engine which carries it—it is a peculiarity of the brilliant arc light, backed by a powerful reflector, that it gives early notice to station men, wayfarers, runners of other trains, tramps and rabbits of the approach of the train bearing the light. In a number of instances this has been strikingly illustrated in the prevention of collisions. The runner using this light cannot see through a hill or a building any better than without it, but by shining above the hill or building the light will make its whereabouts manifest several miles in advance, so that other trains can know that the electrically-lighted train is approaching. The illumination of the particles of dust or moisture in the atmosphere makes a pencil of light which, if the angle of the reflector is properly adjusted, may be seen in the air overhead many miles away, and this often makes an intelligible indication to runners of other trains even if, by reason of a curve in the track between the observer and the point where the light is at that moment, the pencil is some distance away from the line of the road.

Mr. R. C. Vilas, of the National Electric Headlight Company, has recently received a letter from the General Manager of the Cincinnati, Hamilton & Dayton recounting an instance illustrating the value of this feature of the light. An engineman running empty at night, and with the tender foremost, forgot about a passenger train that was due, and would have met it on the

bridge over the Miami River at Hamilton, but he saw the light from the electric headlight of the passenger train before the train was in sight; that is, before it had reached a point where it would have been in sight by daylight, or where the lamp could be seen. The careless engineman at once stopped and succeeded in getting into a sidetrack before the passenger train reached him. This was on a road which is by no means free from curves. With the reflector adjusted at such an angle as to throw some of the rays slightly above the horizon the pencil of light in the sky may be made to pass above all ordinary hills and other obstructions, and thus make the light valuable on a crooked road as well as on straight lines. Enginemen on the Cincinnati, Hamilton & Dayton, as well as on the roads of the Western prairies, assert that they would pay for the lamps themselves rather than do without them.

Air Power to Let.

The Ingersoll-Sergeant Drill Co., whose office is on the tenth floor of the Havemeyer Building, at 26 Cortlandt street, New York City, has placed an air compressor in the engine-room of the building, and air-power will be supplied to all the tenants of the building who desire it. The compressor is run by steam, and compresses the air into an air receiver, where it stands until ready for use. The building is piped throughout, pipes being run up through the shaft with branches at each floor. The Ingersoll Company will probably be the largest user of this compressed air, tools and machines of various kinds being in operation in the company's office for exhibition. In addition, air will open the doors, ring the call bells, operate the letter presses, dust the furniture and clean the carpets, rugs and other furnishings. The Ingersoll-Sergeant Company exhibits these appliances for all visitors, thus promoting a general knowledge of the numerous mechanical and domestic uses for which compressed air is available.

THE SCRAP HEAP.

Notes.

A passenger train of the Union Pacific was stopped by robbers near Uintah, Utah, Oct. 14, about 3 a. m., and some mail bags and other matter were stolen, though the safe in the express car was not opened.

A Michigan paper states that collectors are now employed on the passenger trains of the Duluth, South Shore & Atlantic.

Mr. D. G. Edwards, Traffic Manager of the Cincinnati, Hamilton & Dayton, has issued in pamphlet form several of the speeches recently made before the Cincinnati, Hamilton & Dayton Sound Money Club, at Cincinnati, and these are being gratuitously circulated among employees and others.

The Terminal Railroad Association of St. Louis, operating the Union depot and both bridges, will adopt Brown's discipline on Nov. 1. Each person will be entitled under the new regulations to 65 demerit marks before dismissal. For every six consecutive months' perfect service, free from demerit marks, a credit of 10 marks will be given.

An employee of the Pike's Peak cog railroad has died of injuries received while coasting down the rack railroad on a toboggan. He started from the summit, soon after the passenger train left the station, on a toboggan fitted up with a double set of cleats, to retain a hold on the rack rail and with a peculiar brake applied from the sides. The rack rail is covered with grease and is exceedingly slippery. As the man rounded Windy Point and started down to the Half Way House, the brake broke, and he overtook the passenger train and crashed into it. He lived but a few hours.

President S. W. Fordyce, of the St. Louis Southwestern, has issued a circular, warning all officials and employees that dismissal from the service of the company will be the penalty for anyone who in any manner threatens other officers or employees with dismissal or other punishment of any character whatsoever, on account of exercising their right, the utmost freedom, in voting for the candidates of their choice in the coming election. It is the desire of the management, he says, that all employees shall fully inform themselves as to the issues involved in the pending presidential contest, and then, unawed and unfettered, go to the polls and vote for the candidates of their choice. Their continuance in the service will not be prejudiced by their so doing.

Pacific Deep-Water Harbor Board.

The board to determine the location of a deep-water harbor in the State of California has been organized, in accordance with the provision of the River and Harbor bill, passed at the last session of Congress, as follows: Detailed by the Secretary of the Navy, Rear Admiral John C. Walker; detailed by the Superintendent of the Coast and Geodetic Survey, Assistant Augustus H. Rogers; appointed by the President, Prof. William H. Burr, of Columbia University, New York; George S. Morrison, of New York, and Richard P. Morgan, of Illinois, civil engineers.

Farm Crossings in England.

England is a country which American railroad men are wont to look upon as extremely fortunate in having no grade crossings or so few that there is never any trouble in connection with them. This is not strictly true, for in the level country northeast of London the number of highways crossing tracks at grade is considerable; and in addition to this there is another element, now growing more serious by the increase in the use of steam engines running on common roads, which is set forth in a recent report by Major Marindin, on an accident which occurred on July 29, near Etchingham station, on the South-Eastern Railway. It was a collision between an express train from

Charing Cross to Hastings and a traction engine, to which a thrashing machine was attached, which had come to a stand on a private field crossing and was unable to move. None of the vehicles in the train were damaged and no person was injured, but some chairs were broken in the permanent way. Major Marindin finds that no blame is attached to the driver of the train or of the traction engine. He thinks it far more important than the responsibility of the servants of the company in this particular case to consider the question of how such accidents as these are to be averted, for there are hundreds of field crossings throughout the kingdom with no signals near them. At a very large number of these crossings the danger of their use by traction engines, shown by this accident to be a real danger even under the most favorable circumstances, is very great. It is, he understands, very doubtful whether railway companies have the power to prevent the use of field crossings in any way the owners like, and it seems to be absolutely necessary that the traveling public should be safeguarded: first, by an obligation being imposed upon the owners of traction engines to give notice at the nearest railway station before taking such engines across the line on a field crossing, or occupation crossing, so that the railway authorities may take the necessary steps for the protection of the public; and, secondly, by conferring upon the railway companies (subject to appeal) the power to prohibit absolutely the use by traction engines of all unsuitable level crossings.

William B. Doddridge on the Silver Question.

From an interview with Mr. William B. Doddridge, General Manager of the Missouri Pacific, printed in a recent number of the St. Louis Star, containing much sound sense on the financial issue, we quote the following:

"Under the hard times we have already seen the Union Pacific, the Northern Pacific and the great Atchison, Topeka & Santa Fe in the hands of receivers. The two last-named companies have recently been reorganized. There is certainly one important fact in the reorganization of the Atchison, which shows that the farmer is not alone in his suffering from these hard times. The railroad bondholder is taking the same medicine. Prior to its reorganization the Atchison's annual interest on its bonded indebtedness was \$9,000,000; but now its fixed interest charges have been reduced 50 per cent., simply because the security holders agreed to take one-half.

"This action on the part of the owners of the property shows that not alone the farmer, but the security-holder as well, has suffered from the reduction in prices. And the holders of these securities reside in New England, I understand, and therefore the loss is felt in this country. I firmly believe that under a silver basis the Atchison would go back into the hands of a receiver. Anyway, it would have to reduce operating expenses to be able to pay even its reduced fixed charges, and at least 60 per cent. of the employees of the mechanical department would be thrown out of work.

"The employees of all railroads will inevitably suffer under a free-silver standard. That is as certain as the sun rises in the east. To get as much money as before, wages would have to be increased 47 per cent. That would not be done when the roads are cutting expenses to make ends meet.

"Free silver would absolutely paralyze the iron industry of this country. The railroad companies would have no means to purchase new rails, new cars and everything in the way of new material that enters into construction for track, bridges and equipment. Since 1893 the effect of the hard times upon the iron industry of the United States is apparent. The total product of iron ores in 1892 in this country, according to government statistics, was 16,298,666 long tons, worth \$33,294,896, or \$2.04 per ton at the mine. The total product of iron ores fell in 1893 to 11,587,629 long tons, worth \$19,265,973, an average value of \$1.66 per ton at the mines. This depreciation was owing to the hard times and the economies necessarily introduced in the management of railroads. The farmer, whom some free silver politicians try to make believe is swindled and robbed, is not alone in suffering from depreciated prices. I have mentioned these iron ore statistics to show that the falling prices are purely the result of overproduction and not owing to the commodity value of silver. The price of silver had nothing to do with these cases. The law of supply and demand rules the world."

Exhibit of the General Electric Co., St. Louis.

Among the exhibits thus far arranged by the General Electric Co., at the St. Louis meeting of the American Street Railway Association, are different examples of standard apparatus made by the company, and especially the latest devices developed since the last Convention. A G. E. 1,000-motor equipment will be mounted on a truck and will be shown in operation with an electric brake. One of the Brooklyn Bridge car trucks will also be exhibited. The controller section will include examples of the K 10, B 6 and L 2 controllers, as well as one of those used on the 96 G. E. locomotive of the Baltimore & Ohio Railroad. The company expects to show two rotary converters, each of 100 K. W. capacity, to be arranged so as to show the method followed in the three-phase long distance transmission work and the manner in which power from Niagara Falls is to be delivered to the Buffalo City Railroad.

Plain Talk to Texans.

Mr. L. M. Fouts, President and General Manager of the Weatherford, Mineral Wells & Northwestern Railway of Texas, recently visited New York, and on his return was asked by a reporter for a local newspaper about the prospects for building an extension to his road beyond Mineral Wells. Mr. Fouts gave his questioner no encouragement, but reminded him of a few simple facts in the following language:

"Hereafter money will not be spent as freely in building railroads in the South and West as heretofore. Investors must be shown that at least a fair rate of interest will be paid, and that is what very few, if any, of the smaller roads in Texas have been able to do. Take our own line, for instance, which has been in operation for over five years, and which has been operated with the strictest economy. We have the coal business; the passenger business which the Mineral Wells water draws to us; a large area of country northwest of Mineral Wells all tributary to this line; and a casual observer would suppose this sufficient to support a railroad; but this line has not earned enough in any one year to pay its interest. We have not had losses from cut rates. The reason this and so many other roads do not earn their operating expenses and interest is that the country does not afford sufficient traffic at the rates allowed by the Commission to enable them to do so. Capitalists will not in the future furnish money to build railroads into new territory entirely with a view to development, nor to parallel lines already in operation and struggling for existence, and communities will also be slow to give bonuses and run themselves into debt for the purpose of inducing additional lines to be built, the additional benefits of which are doubtful. The losses that both the capitalists and com-

munities sustained from that cause during the boom that swept over the country, are lessons that they will not soon forget. Those who undertake to raise money to build railroads must be prepared to show conclusively that the country through which they propose to build will furnish enough traffic at the low rates that are allowed by the Railroad Commission, to return a fair interest on the investment. From my talk with men to whom we look for money I find that it will be especially difficult to convince them to invest in the free silver states, and in states where the sentiment appears to be opposed to capital, and where the laws that affect the earnings of railroads are so frequently changed.

The Reading Subway.

Work on the subway for the Philadelphia & Reading Railroad through Pennsylvania avenue, Philadelphia, is now well under way. The temporary tracks have been laid on Hamilton street, and also on Pennsylvania avenue, between Hamilton and Green streets, where a space 40 ft. wide has been cleared for the purpose, on the west side of the railroad. This last has necessitated the removal of a large number of buildings and several coal-yards. Contractors E. D. Smith & Co. began work last week, excavating at Fifteenth and Callow Hill streets, and are making rapid progress. The excavations at that point are already 16 to 20 ft. deep, and it is expected that work on the retaining wall will be begun next week. Operations will be begun very shortly by the same contractors, at Nineteenth street and Pennsylvania avenue. On April 17, the Railroad Gazette gave a full description of the work which is to be done, and in the issue of May 23 a plan and sections of the proposed subway and tunnel were shown.

The Knickerbocker Express and the G. P. A.

E. O. McCormick, Passenger Traffic Manager of the Big Four, is brimful of the praises of the "Knickerbocker Special," the train he had put on between St. Louis and New York about a year ago. "It is the fastest train in the world," said Mr. McCormick. "The schedule of the Empire State Express does not begin to touch our Knickerbocker. She runs from St. Louis to Indianapolis, 263 miles, in 5 hours and 15 minutes and still has half an hour up her sleeve. She has to stop at nearly every station in Illinois. This kind of running is done every day. Not long ago we were side-tracked for her at Windsor, Ill. Mr. Schaff went down the road a short distance and Mr. Van Winkle went up the road, while I remained at the station. I heard Schaff say, 'Here she comes,' and then Van Winkle said, 'There she goes,' but I did not see her at all. I bet she tore up three tons of gravel and dirt near the platform where I was standing. It is an honest fact that one of the heaviest expenses the company has at Windsor is painting the station and putting in windows that have been knocked out by the Knickerbocker in passing. That station is painted every month." —The Indianapolis Evening Story-Teller.

New York State Canal Improvements.

Bids have been called for by Superintendent of Public Works C. W. Aldridge on certain parts of the proposed work of deepening and improving the New York State canals. The following bids pertain to the Erie Canal, the work being distributed as follows: Building the Cartersville waste weir and spillway at Station 721, Sec. 15; improving the canal on Sec. 21 from the head of the Lockport locks to Station 338, near McDonald's culvert; improving the canal between Station 328, Sec. 21, near McDonald's culvert, to Station 87 x 10, Sec. 23, near Ferry street, Buffalo, N. Y.; improving the canal from Station 83 x 10, near Ferry street, to Commercial slip, at Buffalo, N. Y. Bids must be submitted before noon, on Thursday, Oct. 29, 1896.

Bids have also been invited for improving the Erie and Champlain canals as follows: Improvement of the Erie Canal from lock No. 18 to lock No. 19; from lock No. 20 to lock No. 21; from lock No. 27 to lock No. 28; from lock No. 28 to lock No. 29; from lock No. 32 to lock No. 33; from lock No. 33 to lock No. 34, and from lock No. 42 to lock No. 44. Improvement of the Champlain Canal from a point 200 ft. south of the Waterford side cut to lock No. 5; from lock No. 6 to lock No. 7, and from lock No. 15 to lock No. 16. Improvement of the Erie canal from lock No. 22 to bridge No. 55; from lock No. 44 to lock No. 45. These bids must be submitted before noon on Monday, Nov. 2, 1896. Plans and specifications for all of the above work are on view at the office of the Superintendent of Public Works, Albany, N. Y.

The Transportation Club.

Last Friday afternoon the Transportation Club (New York) was formally opened for the use of its members, the occasion being celebrated by a reception which was attended by many members and their guests. This club now has an enrolled membership of 338, of whom 152 are resident members and 186 non-resident. The membership is now limited to 300 resident and 200 non-resident. The club starts without debt and its present revenue is sufficient to run it. It occupies one floor, the fourteenth, of the new Manhattan Hotel at the corner of Madison Avenue and Forty-second street. The rooms are very handsome and complete, including all the requirements for a well-appointed club. No special bedrooms are assigned to the club in the hotel, but practically all the rooms of the hotel are available for the use of club members. The rooms command a beautiful and very extensive view of New York City and the surrounding country, and they will be most delightful in the summer, as they will get an uninterrupted breeze from all quarters.

The Transportation Club is not limited by anything in its constitution to men immediately connected with the business of transportation, the first clause of the section specifying the requirements of membership being "any gentleman shall be eligible to membership." But it is the theory of the club that it shall be made up of railroad men and others immediately concerned in the business of transportation in all its departments, and of those who have closely allied interests, being in this particular something like the Engineers' Club in New York and the Technical Club in Chicago, which are composed not only of engineers, but of those related in business matters to engineers. It is believed that this club will be especially useful to, and frequented by railroad men visiting New York, as well as by those whose business keeps them in the city.

A feature of the club which is quite modern, and which we should suppose would be very pleasant and useful, is that members of the club can make it available to ladies belonging to their own families. There are a ladies' dining-room, a reception room and dressing-room, which can be used by ladies who are registered on a book kept for that special purpose, and ladies so registered can not only visit the club, but take their friends there. Of course they are restricted to the two or three rooms set apart for them, and their presence will not be known outside of their own special rooms.

The present membership includes railroad officers from all over the United States, from as far west as St. Paul, Minneapolis and St. Louis.

The Show Collision.

The latest "show collision," or rather the one which has made the most noise in the newspapers, is one which took place at Elyria, near Denver, Col., Sept. 30, the proceeds of which were for the support of the work of the "Bi-metallic Committee" of the Denver Chamber of Commerce, and evidently to be used to promote the fortunes of the Free Silver candidate for the Presidency of the United States. To provide against an explosion of the boilers of the locomotives a number of soft metal plugs were fitted into the front ends of the boilers, and these were to be punched out at the moment of collision by iron rods, about 8 ft. long, which had been so fixed in front of the boiler as to be pushed inward when the engines came together. The master mechanics of the several roads "guaranteed" that this would prevent all danger to spectators. The reports indicate that the boilers were "bled" according to programme, and the clouds of steam doubtless added much to the *éclat* of the occasion. One of the engines was a trifle timid and traveled with such lagging steps that the collision occurred some distance away from the point calculated upon. There was a canvas barrier to separate the goats, outside, from the sheep who had paid for seats, and the weak-kneed engine came very near giving the whole show to the goats and leaving the sheep in the lurch.

LOCOMOTIVE BUILDING.

The Louisville & Nashville order for 15 engines is reported to have been awarded to the Baldwin Locomotive Works.

The Winona & Western R. R. has recently ordered two locomotives from the Dickson Manufacturing Co., of Scranton, Pa.

The Bondholders' Committee of the Colorado Midland, which has under consideration the reorganization of that property, states that new cars and locomotives will be purchased as soon as funds can be provided, without waiting for the reorganization to be completed, the present rolling stock being inadequate to the needs of the line.

CAR BUILDING.

The Winona & Western road will shortly order 50 box cars.

The Louisville & Nashville is in the market for 300 gondola cars.

The Chicago, Milwaukee & St. Paul is building 30 new cabooses intended especially for stockmen accompanying cattle shipments. Each has three sleeping-car sections, wash-stand, mirrors and other conveniences. The interior of the cars will be grained and the seats will be of oak, and arranged like the seats of a sleeping-car.

From time to time reports have been circulated regarding equipment for the new Butler & Pittsburgh Railroad. The most recent of these that we have seen is that contracts for 1,000 cars are about to be given out and that orders for locomotives will follow immediately. These reports are all based on newspaper statements, which have no basis in fact. The railroad will not be completed for a year or more and the subject of equipment is one which has not yet been considered by the officers of the company, and will not be before next summer.

BRIDGE BUILDING.

Bayard, W. Va.—The court of Grant County has passed \$1,000 at the disposal of Special Commissioner Brown to be used in the construction of a steel truss bridge over the Potomac River, at this place. The bridge is expected to cost about \$2,000, and the difference is to be made up by the town of Bayard. The bridge has long been needed, and will be built as soon as possible.

Beardstown, Ill.—The city is figuring on building a new bridge across the Illinois River.

Bradford, Ont.—The Grand Trunk is preparing to build a new iron bridge near Timothy street. It will be 65 ft. long, with a clear span of 55 ft.

Doubs, Ia.—The Board of Supervisors of Van Buren County has voted in favor of granting an appropriation of \$20,000 with which to build a new bridge across the Des Moines River between this place and Leando.

Ennis, Tex.—There is a movement on foot to build a wagon bridge across the Trinity River near here.

Hamilton, Ont.—The Toronto, Hamilton & Buffalo will build a high-level bridge over the Desjardins Canal at its own expense.

Hartford, Conn.—The street board has decided to recommend to the Court of Common Council that a masonry bridge be built across the Park River in place of the present wooden bridge, and that the city appropriate an amount not exceeding \$25,000 for the purpose.

Indianapolis, Ind.—Plans for rebuilding the bridge over Williams Creek, on the Noblesville road, are being considered by the County Commissioners.

Miles City, Mont.—It is reported that the contract for a 155-ft. steel bridge across Pumpkin Creek has been let to S. M. Hewitt & Co., Minneapolis, at \$3,600.

Moundville, W. Va.—The Baltimore & Ohio has engineers at work, preparing plans for a new steel bridge and approaches at this place where the bridge over Little Grave Creek was carried away by a flood in August. The Ohio River Railroad, which is only a few yards away at this point, also lost its bridge by the same flood, and the two companies are negotiating for building continuous abutments, so both bridges will be practically one.

Newark, N. J.—The Board of Works has awarded the contract for the steel work of the approach at this end of the Passaic River bridge, to the Fagin Iron Works, Hoboken, N. J., at \$21,612. F. C. O'Reilly got the substructure, at \$3,488.

It is reported that the Boards of Freeholders for the two counties have awarded the contract for the superstructure of the river span to the Fagin Iron Works, for \$78,194, and that for the substructure to Sanford & Stillman, at \$61,975.

Niagara Falls, N. Y.—The construction of the Manitoulin & North Shore Railroad, in Ontario, some contracts for which have just been awarded, will necessitate the erection of one steel swing bridge and five other steel bridges. The structures will include two spans of 192 ft.,

two of 85 ft. and one of 70 ft. The contracts will be let by J. J. McIntyre, Gluck Building, this city.

Ottawa, Ont.—The Mather Bridge and Power Co. has got its bill passed by the Railway Committee, and may be soon expected to enter the market, if the promoters realize their expectations.

Point Pleasant, N. J.—The Ocean and Monmouth County Boards of Freeholders have decided to replace the condemned wooden bridge across the Manasquan River between this place and Manasquan with an iron structure.

Quebec, Que.—The steel bridge to be built over the St. Charles River will be commenced at an early date. The bridge will connect the city with St. Sauver, and will cost \$23,000.

In connection with the construction of the electric railroad, it is possible that a bridge will be built over the St. Charles River to Parent Park.

Riverfield, Que.—The contract for an iron bridge of 125 ft. span, across the English River, has been given to the Rousseau Bridge Co., of Montreal, for \$2,500. This includes the supports at each end, which will be metal pillars filled with concrete. A tender was put in for the bridge alone for \$1,500, and one for bridge and stone abutments for \$3,000.

Smethport, Pa.—The Grand Jury has recommended the erection of iron bridges at State Line in Foster Superior and at Turtle Point.

Sutton, W. Va.—The court of Brakton County has asked for bids for a 53-ft. iron roadway bridge with all approaches, foundations and abutments, over Granny's Creek, near the mouth of the stream.

Troy, N. Y.—The contract for the new Melan arch over the Wynantskill at Campbell highway, has been awarded to Robert I. Gleason, of this city, at \$4,395. The other bids were: Clark & Co., New York, design No. 1, \$4,760; design No. 2, \$4,660; Aetna Construction Co., Brooklyn, \$4,869; Springfield Construction Co., Springfield, Mass., \$4,473.

Wheeling, W. Va.—The Pittsburgh, Cincinnati, Chicago & St. Louis has prepared plans and is about ready to begin to straighten Baggs Run, near this place. The railroad crosses it near its mouth, and a new stone arch bridge will be built here to accommodate the new channel.

Youngstown, O.—At the election on Nov. 3 a vote will be taken on the question of building three county bridges across the Mahoning River at this place, at a total cost of about \$150,000.

MEETINGS AND ANNOUNCEMENTS.**Dividends.**

Dividends on the capital stocks of railroad companies have been declared as follows:

Great Northern, quarterly, 1½ per cent. on preferred stock, payable Nov. 2.

Lake Erie & Western, 1¼ per cent. on preferred stock, payable Nov. 14.

Long Island, quarterly, 1 per cent., payable Nov. 2.

New Orleans & Carrollton, quarterly, \$1.50 per share, payable Oct. 20.

St. Paul, Minneapolis & Manitoba, quarterly, 1½ per cent., payable Nov. 2.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama & Vicksburg, annual, Jackson, Miss., Nov. 2.

Baltimore & Ohio Southwestern, annual, Central Trust Co., New York, Nov. 19.

Buffalo, Rochester & Pittsburgh, annual, Union Trust Co., New York, Nov. 16.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 28.

Chicago Junction Railways and Union Stock-Yards Co., annual, Jersey City, Nov. 12.

Central of Georgia, annual, Savannah, Ga., Nov. 10.

Central Massachusetts, annual, Union Station, Room 15, Boston, Oct. 28.

Danbury & Norwalk, annual, Consolidated Railroad Company's building, New Haven, Oct. 29.

Fall Brook, annual, Reading Center, N. Y., Nov. 11.

Lehigh Valley, annual, J. R. Fanshawe, Philadelphia, Pa., Nov. 17.

Manhattan, annual, Mercantile Trust Co., New York, Nov. 11.

New Orleans & Northwestern, annual, Secretary of company, Nov. 4.

New Orleans & Northeastern, annual, New Orleans, Nov. 4.

Raleigh & Gaston, annual, John H. Sharp, Treasurer, Portsmouth, Va., Nov. 12.

Richmond, Fredericksburgh & Potomac, annual, J. B. Winston, Secretary, Nov. 10.

Rio Grande Western, annual, Salt Lake City, Utah, Oct. 25.

Santa Fe, Prescott & Phoenix, annual, Prescott, Ariz., Nov. 18.

Savannah, Florida & Western, annual, Savannah, Ga., Nov. 24.

South Carolina & Georgia, annual, Continental Trust Co., New York, Nov. 11.

Spokane Falls & Northern, annual, Spokane, Wash., Nov. 9.

St. Louis & San Francisco, annual, St. Louis, Mo., Oct. 27.

Wilmington & Weldon, annual, James F. Post, Wilmington, N. C., Nov. 18.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Engineers' Club of Philadelphia* will hold its next business meeting on Oct. 30.

The *Society of Naval Architects and Marine Engineers* will hold its third general meeting at No. 12 West Thirty-first street, New York City, on Nov. 12-13.

New York Electrical Society.

The 175th meeting of the Society was held at Columbia University on Oct. 13 at 8 p. m. President Emery delivered his inaugural address entitled, "Reminiscences of Forty Years of Engineering Experience."

Western Railway Club.

Mr. J. N. Barr's paper on the "Apprentice Boy" and Mr. H. D. Judson's paper entitled, "Railroad Ethics," were the subjects for discussion at the October meeting of the club held in the Auditorium Hotel, Chicago, on Tuesday of this week. The committee appointed at the September meeting to consider difficulties arising under the new interchange rules of the Master Car Builders' Association submitted a report.

The Civil Engineers' Club of Cleveland.

A meeting of the club was held Oct. 13, 53 members and visitors present. Resolutions upon the death of Mr. J. F. Holloway and of Dr. C. O. Aroy were read and adopted. Mr. J. D. Varney then presented the paper of the evening, "Solar Work in Land Surveying." Mr. Varney gave a simple explanation of the principles governing solar work and of a new device for use in that method of land surveying.

St. Louis Railway Club.

The regular monthly meeting of the St. Louis Railway Club was held at the Southern Hotel, Oct. 9. About 75 members were present. Frank Reardon, President of the Club, presided. The discussion was on J. W. Stokes' paper on the use of pressed steel and malleable iron in car construction.

A paper by G. S. McKee on "Locomotive Supplies" was read. The club adjourned to meet on Nov. 13.

American Society of Civil Engineers.

The regular bi-monthly meeting of the society was held on Oct. 7. A paper was read by Mr. W. A. Rogers, Jun. Am. Soc. C. E., on "The Reconstruction of Grand River Bridge." The Nominating Committee presented the following candidates for the next election: For President, Benjamin M. Harrod, New Orleans, La.; for Vice-President, George H. Mendell, San Francisco, Cal.; John F. Wallace, Chicago; for Treasurer, John Thomson, New York; for Directors, from District No. 1, James Owen, Newark, N. J.; and Rudolph Hering, New York; for District No. 4, H. G. Morse, Wilmington, Del.; for District No. 6, B. L. Crosby, St. Louis; for District No. 7, H. S. Haines, Atlanta, Ga., and L. M. Johnson, Eagle Pass, Tex. An announcement was made that the paper to be presented at the next regular meeting on Oct. 21 would be "Suspension Bridges, a Study," by Mr. G. S. Morison.

Engineers' Club of Philadelphia.

The regular meeting of the club was held Oct. 3, with President A. Falkenau in the chair, and 65 members and visitors present. The paper of the evening was presented by Mr. Richard L. Humphrey on the subject of "The Cement Laboratory of the City of Philadelphia." Special reference was made to the equipment and methods of operation of the laboratory, especially in regard to hot water tests and the process of determining the fineness of a cement, the time of setting, the specific gravity, etc. He stated that during the last four years there had been collected over 2,000 samples of 66 different brands of cement (both natural and Portland) and the testing of these had involved the molding of over 30,000 briquettes, of which over 25,000 had been broken. F. L. Lewis, James Christie, J. M. Porter, J. K. Little and Tinius Olsen took part in the discussion.

New York Railroad Club.

At the meeting on Thursday evening, Oct. 15, the subject for discussion was "Car Heating by Steam," based upon the paper by Mr. R. M. Dixon, of which an abstract was printed in the *Railroad Gazette* last week. The attendance was larger than at any other recent meeting of the club, and the discussion was unusually well maintained. Among those who spoke were: Messrs. A. E. Mitchell, of the Erie; Higgins, of the Lehigh Valley; Hayward, of the Pennsylvania; Stewart, of the West Shore, E. E. Gold and J. F. McElroy.

We shall here only refer in an exceedingly brief manner to the discussion, as the printed report has not yet been published. Mr. Gold spoke at some length, advocating the use of traps on train pipes, and Mr. Mitchell and a number of the other speakers also argued in favor of the use of traps. One point brought up in the discussion was the amount of steam pressure needed to properly heat a train of cars. On the Pennsylvania it was reported that this was from 5 to 10 lbs. where the return system is used. On the Erie 50 lbs. is used for a train of 14 cars, but sometimes 75 lbs. is used; and on the Lehigh Valley 40 lbs. is the normal amount for a train of seven cars. On the Chesapeake & Ohio trains of nine cars and over are heated with from 20 to 30 lbs. pressure. One member in speaking of the relative advantages of hot water circulating and direct steam heating from pipes said that the former had many advantages in sleeping and special cars, where it was necessary to heat toilet-rooms and other places, but for the usual coaches on local trains, direct heating had advantages.

Engineers' Club of St. Louis.

The club met Oct. 7, 17 members and one visitor present. Rules and regulations governing the care, maintenance and disbursement of the engineers' entertainment fund were adopted. The nucleus of this fund was derived from the local committee of the American Society of Mechanical Engineers, and a contribution from the Engineers' Club of St. Louis and is to be devoted solely to the entertainment of distinguished engineers visiting St. Louis in small parties or singly. Applications for membership were announced from Sidney W. Farnham, Mechanical Engineer Missouri Pacific Coal Companies, and Chas. F. Womeldorf, Draughtsman Water Works Extension.

Mr. Alfred Siebert then read the paper of the evening, on "Refrigeration," as applied to dwellings, hotels, hospitals, business houses and public institutions. He explained the different methods of refrigeration which have heretofore been used, and advantages and the disadvantages of each, calling particular attention to the merits of modern refrigerating machines. The different use to which such machines may be put are: the cooling of rooms, ice making, freezing of carafes, making ice cream, and cooling air in living-rooms. The cooling may be done either by the direct or indirect system, each having its advantages under certain conditions. The cooling of rooms may readily be combined with the indirect heating system. Discussions followed by Messrs. Kinealy, Barth, Johnson, Flad and Crosby. Mr. Carl Barth gave the club an interesting discussion of a geometrical method of determining the best points of cut-off and compression, which subject was also discussed by Messrs. Kinealy and Flad.

Meeting of the American Society of Municipal Improvements.

Two hundred members of the American Society of Municipal Improvements met Oct. 14, at Kinsley's Hall, Chicago, and remained in session three days, this being the third annual meeting. The society is composed largely of engineers of the principal cities. Among the papers presented were the following:

"Advantage of an Asphalt Testing Laboratory," by Mr. N. P. Lewis, Engineer of Street Construction and Maintenance, Brooklyn.

"Specification Requirements for Asphalt, Asphalt Mixtures and Tests of Asphalt," by Mr. A. W. Dorr, Inspector of Asphalts and Cements, Washington, D. C.

"Paving Streets with Brick," by Mr. S. J. Hathaway, Chairman Street Committee, Marietta, O.

"Paving in Nashville, Tenn.," by Mr. J. L. Kennedy, member of the Board of Public Works, Nashville, Tenn.

"Modern Street Railway Track Construction on Asphalt Paved Streets in Minneapolis," by Mr. F. W. Capelen, City Engineer, Minneapolis, Minn.

"Testing Paving Brick," by Mr. A. D. Thompson, City Engineer, Peoria, Ill.

"Rumblings of Street Pavements," by Mr. E. A. Adams, Newark, N. J.

"First Cost and Maintenance of Pavements," by W. F. Williams, New Bedford, Mass.

"Improved Construction of Pavements," by Mr. M. A. Downing, Indianapolis, Ind.

"Cost of Repairing Asphalt Pavements," by Mr. E. B. Guthrie, Buffalo, N. Y.

Mr. G. L. Clausen, Superintendent of the Sewer Department of Chicago, explained the methods employed in that city for the disposal of sewerage, and Mr. J. W. Hill, Consulting Engineer of Cincinnati, O., read a paper entitled "Purification of Chicago Water Supply." The subjects of taxation and assessment were discussed.

The members of the society spent one day inspecting the work on the Chicago Drainage Canal, a special train being furnished by the Atchison, Topeka & Santa Fe road.

The next meeting will be held at Nashville, Tenn.

The officers elected for the ensuing year are: President, August Herrmann, Cincinnati; First Vice-President, E. B. Guthrie, Buffalo; Second Vice-President, W. D. Kerr, Chicago; Third Vice-President, Ernest Adams, Newark, N. J.; Secretary, D. L. Fulton, Allegheny, Pa.; Treasurer, John L. Kennedy, Nashville, Tenn.

Southern & Southwestern Railway Club.

At the August meeting the President, Mr. R. P. C. Sanderson, read a paper on Chilled Versus Steel Tired Wheels, extensive extracts from which we shall publish. He also read a paper on Engine Boards, describing the system developed on the Norfolk & Western. An extract from this will be published in the *Railroad Gazette*.

The next meeting of the club, the annual election, will be held and the meeting will take place at Atlanta, Nov. 19. It was decided also to have a banquet at that meeting, and a committee was appointed to make the arrangements.

The Executive Committee has selected the following subjects and special committees for the meetings of November, January and April.

Piece Work for Car Repairs.—Special Committee—Messrs. A. B. Corin, G. D. Harris, R. P. C. Sanderson. For November meeting.

Weakness and Failures of Side and End Freight Car Doors. Special Committee—Messrs. E. M. Roberts, S. A. Charpiot, R. P. C. Sanderson, W. H. H. Price and Jas. Cullen. For November meeting.

Ratio of Grate Area, Heating Area and Cylinder Volume. Special Committee—Messrs. E. Burton, F. E. Tubbs, O. G. Cheatham. This committee to present to the Club a tabulated report secured by the use of a general form, such as they may select, filled in by members giving measurements of as many engines as possible, considered as satisfactory in these respects, giving cylinder capacity, flue and other desirable dimensions. For November meeting.

Standing Committee on M. C. B. Rules.—Messrs. R. P. C. Sanderson, J. M. Holt and S. A. Charpiot. This committee to report at the April meeting.

The Executive Committee also selected Messrs. A. T. Hooker, P. H. Schreiber and W. A. Love as a special committee to report at the January meeting, on "Uncoupling arrangements for M. C. B. Couplers."

Messrs. J. E. Worswick, J. T. Robinson and T. B. Irvin, selected as committee to watch the practical workings of the recently adopted recommended practice for loading lumber, and report on same with recommendations for improvements or changes if desirable, are to report at the January meeting of the club.

Messrs. W. H. Owens, O. B. Bidwell and J. B. Michael, are a special committee on "Trains Parting."

Messrs. C. F. Thomas, F. H. McGee, H. A. Gillis, special committee on "Exhaust Pipes." Committee to arrange for patterns to be made for exhaust pipes, and nozzles for engines of large power and capacity, 19 or 20-inch cylinders; patterns conforming accurately to recommendations made by M. M. Committee, at Convention of 1896.

Messrs. James Magle, William Anderson and James F. Blackwood, committee on "Painted versus Platinized Iron for Jackets." Committee to collect information of the experiments now going on in this line, and to report as to relative cost and appearance at the January meeting of the Club, and to make a subsequent report as to wearing qualities at the April meeting of the club.

PERSONAL.

—W. A. Wolford, Master Mechanic of the Cleveland, Cincinnati, Chicago & Columbus shops, at Bellefontaine, has resigned.

—Mr. J. N. Hazelhurst, of Atlanta, Ga., has been appointed Civil and Supervising Engineer of the St. Augustine (Fla.) water works, about to be built.

—Mr. John Hobbs has been appointed Assistant Freight Agent for the Atchison, Topeka & Santa Fe road, with headquarters in Chicago. Mr. Hobbs is transferred from the claim department.

—Mr. Charles Levy has resigned the Presidency of the New Orleans & Western, the new belt line at New Orleans, La. Mr. Levy is largely interested in the New Orleans cotton trade, and was elected to this office last fall.

—Mr. E. G. Fisher, who has for several years past represented the Page Woven Wire Fence Co., has left that company to take charge of the railroad department of the McMullen Woven Wire Fence Co., of Chicago, as Sales Agent. Mr. Fisher has been a very successful agent and we have no doubt that he will prosper in his new connection "after election."

—Mr. Elliott Marshall, for 16 years connected with the Burlington lines and at present General Agent at Leavenworth, has been appointed Division Freight and Passenger Agent at St. Joseph, and will succeed Assistant-General Freight Agent Bartle at St. Joseph. Mr. R. K. Smith, Traveling Freight Agent for seven years past, has been appointed Mr. Marshall's successor at Leavenworth.

—Mr. Robert E. O'Brien, who died in New York Oct. 18, was an engineer who formerly held responsible positions, but for some years he had retired from active life. Mr. O'Brien was born in Philadelphia in 1833. He was employed on railroad work in early life and in 1868 he was engaged to construct a railroad in Missouri,

which is now part of the Wabash. He was engaged in other Western railroad work and was Vice-President and Chief Engineer of the Atlantic & Great Western when General McLellan was its President; was Chief Engineer of the Northern Pacific and Manager of the Northern Pacific Terminal Co. from 1882 to 1884, and in 1887 built the Cumberland Valley extension of the Louisville & Nashville railroad. Since 1891 he had been acting as Railroad Expert.

—Mr. Frederick Harrison, General Manager of the London & North Western Railroad of England, and Mr. Robert Turnbull, Superintendent of the line, who with their wives have been making a tour of this country, sailed for England from New York on Oct. 21 on the steamship Majestic. The party arrived in this country Aug. 21 and left immediately for the West. We learn from a souvenir programme prepared and issued by Mr. C. A. Barattini, General Passenger and Freight Agent of the Company in the United States, who arranged the trip and accompanied his superiors throughout the entire tour, that during the two months since they arrived the party has traveled over 12,660 miles of railroad in 27 states and several of the British provinces. The Pullman special car Haslemere was placed at the disposal of the party, and the entire journey was made in that car. The first objective point visited was Niagara Falls; thence the party proceeded to St. Louis, Denver, Salt Lake City and San Francisco, returning via Portland, Minneapolis and Chicago. Toronto and Montreal were visited, and then Boston, Pittsburgh and Washington. The trip was extended two weeks longer than originally intended to allow visits to the Yosemite Valley and the Yellowstone National Park. The railroads traveled over were the New York Central & Hudson River, Lake Shore & Michigan Southern, Cleveland, Cincinnati, Chicago & St. Louis, Chicago, Burlington & Quincy, Denver & Rio Grande, Colorado Midland, the Manitou & Pike's Peak, Rio Grande Western, Southern Pacific, Seattle & International, Northern Pacific, Canadian Pacific, Minneapolis, St. Paul & Sault Ste. Marie, Chicago, Milwaukee & St. Paul, Illinois Central, Grand Trunk, Central Vermont, Boston & Maine, New York, New Haven & Hartford, and the Pennsylvania.

Messrs. Harrison and Turnbull were entertained at various points, by railroad officers, and they say they were everywhere received with cordiality that was gratifying to them and much appreciated.

The ubiquitous newspaper reporter made many attempts to induce Messrs. Harrison and Turnbull to comment on what they had observed of American railroads and operating methods, but generally with little success. Mr. Harrison spoke of the more solid roadway of the English lines, although he thought some Eastern lines were very solidly constructed. He thought the equipment very fine, but did not believe American passenger cars suited to English conditions. The shops and car building plants favorably impressed him and he admired the office telephone system. He was surprised at the costly passenger stations in many cities and their elaborate furnishings and decorations. He remarked the absence of fixed signals, particularly on the Western lines.

ELECTIONS AND APPOINTMENTS.

Chicago Great Western.—The directors have re-elected the following officers: President, A. B. Stickney; Vice-Presidents, A. Oppenheim, C. W. Benson and A. Kalman; Secretary, R. C. Wright; Treasurer, Charles O. Kalman; Vice-President and Auditor, W. B. Bend; General Manager, S. C. Stickney. The stockholders held their annual meeting several weeks ago.

Indiana, Decatur & Western.—At the annual meeting of the road last week M. D. Woodford, President of the Cincinnati, Hamilton & Dayton; M. M. Shoemaker and A. Taylor were re-elected, as was the old board. No action pointing to the consolidation of the line with the Cincinnati, Hamilton & Dayton was taken. The directors elected M. D. Woodford President.

Indiana, Illinois & Iowa.—James S. Bartle has been appointed General Freight and Passenger Agent of this company, with headquarters at Chicago, vice S. S. Whitehead, who has resigned to accept service with another company.

Piedmont & Cumberland.—This company, whose line is operated by the West Virginia Central & Pittsburgh, held its annual meeting on Thursday last, and the following officers and directors were elected: Directors, Henry G. Davis, Stephen B. Elkins, R. D. Barclay, George C. Wilkins, W. H. Garman, W. J. Reed and C. M. Hendley. Henry G. Davis was elected President and C. M. Hendley Secretary.

Pullman Palace Car Co.—At the annual meeting of the stockholders in Chicago more than \$27,000,000 of the capital stock was represented, and the following Directors were re-elected: George M. Pullman, Marshall Field, J. W. Doane, N. Williams, O. S. A. Sprague, H. C. Hurlburt and H. R. Reed. Mr. Pullman was re-elected President, and former Second Vice-President Thomas H. Wyckes was elected First Vice-President, to succeed Gen. Horace Porter, resigned. No second vice-president was elected.

Quebec, Montmorency & Charlevoix.—The following have been elected directors: Messrs. H. J. Beemer, Frank Ross, T. A. Piddington, John T. Ross, Gavin Moir, P. P. Hall, H. G. Beemer. The officers of the company are H. J. Beemer, President; Frank Ross, Vice President; Lawrence Lynch, Secretary and Treasurer; W. E. Russell, Superintendent.

St. Paul & Duluth.—The stockholders held their annual meeting in the General Manager's office, St. Paul, Oct. 9. The following Directors were elected, succeeding themselves: R. B. Dodson, New York; John L. Ricker, New York, and A. B. Plough, St. Paul. As there was no quorum of directors the meeting for the appointment of officers was postponed until President Hayes returns to New York.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Benton Harbor & Southeastern.—Work has been commenced on this line, which is planned to run from Benton Harbor, Mich., to Nappanee, Ind., where connection is to be made with the line surveyed to Cincinnati and Milwaukee via Lake Michigan. It is proposed to

operate a line of steamers across Lake Michigan from the Indiana terminus to Milwaukee.

Canadian Roads.—The Dominion Parliament has passed bills authorizing the South Shore Railway to construct a line from Levis to Valleyfield, on the Canadian Atlantic, and the St. Catharines & Niagara Central, to which authority is given to construct a branch line from St. Catharines to Smithville.

Chicago & Alton.—A preliminary survey is being made under the direction of Chief Engineer H. C. Draper, from Washington, Ill., to Peoria, a distance of 12 miles, for the purpose of making an estimate of the cost of building a branch of the road into Peoria. It has not yet been definitely decided whether or not the extension will be built.

Chicago, Montello & Northwestern.—This company has been organized in Wisconsin to construct a road from the east line of Green Lake County westward 125 miles to the west line of Juneau County, through Green Lake, Marquette, Adams and Juneau counties.

The first Directors are James L. Pennifill and Alfred K. Welles, of Chicago; Clarence E. Pierce, of Germania, Marquette County, and Eldridge W. Underwood and Samuel W. Stimson, of Montello.

Detroit & Mackinac.—Soon after the organization of this company, in December, 1894, as the successor of the Detroit, Bay City & Alpena, active steps were taken to extend the line south toward Bay City. This is an important town on Saginaw Bay, just north of Saginaw, furnishing a good traffic and having excellent railroad connections. The company formerly reached it over the Michigan Central, an indirect route, the connection being the southern terminus of the road, and otherwise an unimportant point. The new line is 47 miles



Detroit & Mackinac Railroad.

long altogether, of which 15 miles, from Emery Junction, where it leaves the old line, to Omer, was built in 1895, and the second division, of 32 miles, was completed this year, and opened to traffic in September.

The new line goes through a good farming country, with much timber on the northern section.

From Bay City to Tobico is farming country with market gardens; from Tobico through Linwood to Lengsville the line is along the beach through a farming country; Lengsville through Michie to Pinconning, is farming land; Pinconning through Saginaw and Pine River to Omer is an old well-settled farming country; Omer through Turner to Emery Junction is an undeveloped country with a few fine farms around Turner. Much of the land is covered with a heavy growth of fine hardwood timber. Limestone and gypsum is found here, and coal is known to be only a few miles away from the line, if not actually under it.

The Saginaw River bridge, at Bay City, has four fixed spans 113 ft. each and two draw spans of 96 ft. each in the clear, giving a total length of the drawbridge of 240 ft. Water in the river is 32 ft. deep and mud about 30 ft. deep. Foundations are on piles cut off at the bottom of the river. The masonry is all of Ohio sandstone. The Kawawlin River bridge, a little north of this, is a drawbridge of two 44-ft. clear openings. At the Pinconning River is a 60-ft. plate girder; at Saginaw River 60 ft. plate girder; Pine River, 110-ft. plate girder, and at Rifle River, 110-ft. pony truss. All these bridges were built by the Detroit Bridge & Iron Works on specifications as severe as any of the Pennsylvania or Michigan roads. The masonry is Ohio sandstone backed with native limestone. All masonry was built by M. J. Griffin, contractor, of Detroit, Mich.

Leaving Saginaw River Bridge there is a 12-deg. curve 3,000 ft. in length, then a tangent for five miles. In the next 1½ miles there are two slight curves of 1 deg. Then two miles of tangent along the beach of Saginaw Bay. Then 1,000 ft. 1 deg. curve. Then three miles tangent. Then 3,000 ft. of 30 deg. curve still following beach. Then six miles tangent to Pinconning; then 1,500 ft. 1 deg. curve; then 14 miles tangent to Omer. Then 600 ft. 1 deg. curve; then 17 miles tangent to Emery Junction where old track is joined with 3 deg. curve. The line is practically level. Some short pieces of grade 15 ft. to the mile are used between Bay City and Omer, and some short pieces of 30 ft. to the mile are used between Omer and Emery Junction with the traffic which will be largely southbound. No rock was encountered except in two cases; one where shallow cuts developed limestone of a merchantable quality and the other a fine bed of gypsum suitable for alabaster (staff) and land plaster. Over three-fourths of the road-bed is in embankment. Gravel was largely used to get the necessary height above the water for good drainage instead of material from the ditches, which were made continuous and of ample depth and width. Campbell & Kennedy, of Bay City, Mich., did the clearing and grading. Work was begun on Saginaw River bridge in March, 1896, on the grading May 1, and the line was opened Sept. 20. Track was laid and ballasted by the company. Seventy-pound rail with 44-in. angle splices with six bolts was used. Twelve inches of good gravel was put under the ties. Right of way is 100 ft. wide. Mr. J. D. Hawks is General Manager and D. J. Casey, of Bay City, is Chief Engineer.

Duluth & North Dakota.—The exploring party consisting of W. B. Kellogg, of West Superior, Wis., the attorney for the railroad; H. Ferguson, its engineer, and others, has returned to the head of the lake after spending four weeks in the forests of Northern Minnesota. They report that they have found a line for a distance of 100 miles northwest from Deer River, Minn., with easy grades. It is announced that the negotiations for money for the actual construction of the road will now be pushed. A survey of the line is to be made this fall if possible.

Flint & Pere Marquette.—The Toledo extension of the road has been completed from Monroe, Mich., to Alexis Junction, O., about three miles north of Toledo. The extension is 18 miles in length.

Florida Western.—This road, projected from Apalachicola, Fla., to Thomasville, Ga., a distance of 121 miles, is preparing to begin the work of construction at Apalachicola, and is now sending laborers to that point.

Great Northern.—The extension of the Moorhead and Halstad branch, from Halstad, Minn., to Carman, Minn., 33 miles, is now completed and open for business. Foley Bros. & Guthrie, of St. Paul, were the contractors for grading, bridging and tracklaying.

Tracklaying has begun on the extension of the Hope branch from Hope, N. Dak., to Aneta, N. Dak., 28 miles. It is expected to complete the work by Nov. 1.

Hamilton & Dundas.—Messrs. Leather & Watson, of Hamilton, Ont., have been awarded the contract for the material for renewing this line and work will be commenced within a week. New 65-lb. rails will be laid on the entire line and steel culverts will take the place of the present structures.

Huron & Ontario.—The engineer of the Huron & Ontario Railway has completed his report on the proposed route of the line, and has forwarded it to Miller Bros., of New York, who are expected to undertake the construction of the road.

Hutchinson & Southern.—Receiver Walker has selected the town of Medford, Oklahoma, as the southern terminus of the extension into Oklahoma, to connect with the Chicago, Rock Island & Pacific. Medford is a town of about 600 people, 22 miles south of Cameron, the present terminus. The extension is now graded to Waketa, about 10 miles from Medford, and work on the remainder of the road will be pushed rapidly. The rails are being put down, and it is expected that by Dec. 1 trains will be running into Medford. This extension gives the road an outlet south and also a line to the coal-fields of the territory.

Kansas City, Pittsburgh & Gulf.—The track of the road is now all surfaced up and ready for operation to Many, La. Train service will be commenced on Oct. 23. There still remain 60 miles of track to be built south from Horatio, Ark., but owing to the mountainous country it is difficult to build. Work is to be started at once on this, and as soon as connections with Horatio are made it is estimated earnings will treble. A great body of manganese ore has been found near Mena, Ark. It has been bought by Chicago parties. Shipments of 1,200 cars a month are estimated from this source.

Lake Superior & Ishpeming.—The right of way for the extension of the line over the Lake Superior Iron Co's land, at Marquette, Mich., has been secured and the active work will start just as soon as the dwellings are removed. If necessary, the construction work will be carried on during the winter months, as the company intends to have the extension completed by the opening of navigation next spring. The extension of the line to the Lake Angeline, Salisbury and Cliff mines, including the numerous side tracks which will be put in, will require considerable work and will necessitate the employment of a comparatively large force of men.

Manitoulin & North Shore.—The contract for this road, referred to two weeks ago, has been let by J. J. McIntire, of Niagara Falls, N. Y., to W. B. Strong & Co., 15 Wall street, New York City. The road will extend from Little Current, on Manitoulin Island, Ont., north to a connection with the "Soo" line of the Canadian Pacific. The distance is 40 miles, of which the first 20 miles, crossing the island at the head of Georgian Bay to the mainland, will involve heavy work. The bridges will be important, including one steel swing bridge. There are five other spans. The officers are: President, Hon. Peter Ryan, Toronto, Ont.; Vice-President, David Isaacs, Niagara Falls, N. Y.; Secretary, Robert H. Burns, Toronto; and Treasurer, Hon. David Phillips, Niagara Falls, N. Y.

Mexican Central.—The extension of the Guadalupe division of the Mexican Central Railway to Ameca is now completed and opened for traffic. Surveyors are now in the field looking over the ground for an ultimate extension of the line to the Pacific coast. Nothing in the way of active construction will, however, be done at present, nor indeed will any new construction work additional to what has already been laid out be entered upon this year. The proposed direct line from Tampico to the City of Mexico is still under consideration, and surveyors are now looking over the route with a view to getting estimates of the cost, but the line will not be built for some time to come.

Mexican International.—The branch west from Matamoros, Mex., on the main line, has just been opened to traffic to Zaragosa, in the heart of the Laguna cotton-growing region in Mexico. There are three large cotton mills in that particular section of country, one at Monclova, one at Saltillo and the third in Parras.

Midland Railway of Nova Scotia.—The contract between the company and the Dominion Government for the construction of a road between Truro and Windsor, N. S., has been signed.

Pe Ell.—Surveys are now being made for this road, from Pe Ell, Wash., to the mouth of the Columbia River, about 30 miles. If the road is built, it will open up large quantities of coal, in the vicinity of Centralia, Wash., and a coaling station will probably be established at the mouth of the Columbia River.

Phillips & Rangleley.—A. F. Hilton, Chief Engineer has just returned from the woods, where he has been at work seven weeks at the head of a party of engineers locating the Kennebec branch of the road, from Dead River to Kennebec Lake. He reports that it will be an easy road to build.

Pittsburg & Western.—The second tracking between Allegheny and Rock Point, Pa., is about completed. The only unfinished sections between the points named are between Witmer and Bakerstown, and Evans City and Zellenople. By the building of 12 more miles of double track the road will have practically a double-track line for a distance of about 46 miles. The cost has been heavy, as there have been tunnels to widen, large fills and changes of lines. Between Callery and Evans City the old roadbed was abandoned, and a new line built for several miles. It is the intention of the company to complete the three sections of single track and make the road double track all the way to New Castle before 1898. West of New Castle Junction there are numerous lap sidings which will permit the road to be double tracked from the Shenango River to Akron at much less expense.

St. Louis & San Francisco.—Press dispatches from Kansas City state that this company is likely to shortly enter Kansas City over a line of its own or a controlled company. The plan outlined is to build 35 miles of new road from Bolivar, Mo., to Osceola, where connection will be made with the Kansas City, Osceola & Southern. John I. Blair, principal owner of the Osceola road, is a member of the Reorganization Committee of this company.

Texas Midland.—The extension of the road from Greenville north to Paris, Tex., has just been completed and will be open for business Oct. 25. The road is owned by Mrs. Hetty Green, of New York, and is in charge of her son, E. H. R. Green, as President. The new line is 45 miles long.

Vancouver, Victoria & Eastern.—Surveys will be completed in about five weeks for the proposed road to be built by this company from Vancouver to New Westminster, crossing the Fraser River by a railroad and traffic bridge. The cost of construction is placed at \$400,000.

Wisconsin & Michigan.—It has been announced that this road will, next Spring, build an extension of its line, from its northern terminus, at Faithorn Junction, Mich., east to Iron Mountain and Norway, Mich., about 15 miles. The road now extends from Menominee, Mich., north 51 miles to Faithorn Junction. An ultimate extension is expected from Iron Mountain to Ironwood and Bessemer, Mich.

Electric Railroad Construction.

Benwood, W. Va.—The Moundsville and Benwood Electric road, which runs from Benwood to Moundsville, W. Va., eight miles, connecting at Benwood with the Wheeling City electric line, has been opened to the Moundsville camp grounds, adding another mile to its length. The road is still in the hands of a Receiver, but is doing a satisfactory business.

Brimfield, Mass.—The project for an electric street railroad from Brimfield, westwardly to Palmer, eight miles, has taken shape in the formation of a company, to be called the Brimfield & Palmer Street Railway Company. A meeting of prominent citizens was held in Palmer last week and the following officers were elected: President, Newton S. Hubbard; Clerk, D. L. Bodfish; Treasurer, Dr. R. V. Sawin; Directors, E. R. Pierce, E. G. Hastings, C. R. Tarbell and O. F. Brown. The address of the President is Brimfield. The articles of incorporation will be at once published and the proposed amount of capital stock is \$80,000. The directors intend to make a survey and to ask for a special act from the legislature authorizing the company to carry express matter, mail and freight. Palmer, the junction of the Boston & Albany and the New London Northern is the nearest railroad station to Brimfield.

Bristol, Pa.—The construction of the Langhorne & Bristol Electric Railway is progressing rapidly, and the system will be in operation within two weeks' time. It is expected that the road will be continued down Mill and up Radcliffe streets, Bristol, within a short time.

Brunswick, Me.—The electric road between Brunswick and Topsham, noted in our issue of Oct. 9, was opened Oct. 13. Directors of the road are: F. C. Libby, of Waterville, and Amos F. Gerald, of Fairfield. The road is only 3½ miles in length, but may be extended 20 miles to Lewiston in one direction and to Mere Point or Harpswell in the other.

Chester, W. Va.—The East Liverpool & Rock Spring Street Railway Co. has been incorporated to construct a line connecting this city with East Liverpool, O. The capital stock is \$100,000. The incorporators are as follows: James E. McDonald, William L. Smith, George H. Owen, J. S. Hilbert and E. D. Marshall.

Chicago.—An ordinance has been introduced into the City Council to grant the General Electric Co. a franchise to build an electric road on Twenty-third, Twenty-eighth and other principal streets in Chicago, to be operated by an underground cable or an underground electric system.

Cranston, R. I.—New heavy rails have been laid for one track from Arlington to the Cranston Print Works. The companion line is being built as rapidly as possible and soon double service will be maintained.

De Land, Fla.—An electric road is to be built between De Land and the beach at Daytona. About \$60,000 has so far been subscribed to the capital stock.

Elmsford, N. Y.—It is said that work will be begun at this place next week, on the extension of the New York, Elmsford & White Plains electric road from

Elmsford to Tarrytown, and thus connect White Plains with the Hudson River towns. This extension will prove a great convenience to those who reside along the river front of Westchester County.

Holmesburg, Pa.—At the meeting of the Street Railway Committee on City Councils on Oct. 15, it was decided to recommend the ordinance granting permission to the Holmesburg, Tacony and Frankford Electric Railway Co. to lay double tracks on Unruh street.

Malden, Mass.—At a meeting of the Malden City Council recently, the Lynn & Boston Street Railway Co. was granted a location in the center of Florence street, the track to run close to the Boston & Maine depot.

McKeesport, Pa.—There are rumors that the Second Avenue Traction Co. does not intend to abandon its purpose of running cars into McKeesport because of its failure to get across the tracks of the Monongahela division of the Pennsylvania either at grade or overhead. It is said that a survey has been made for a roadway from near Calhoun Park to the Monongahela River, and that the company will abandon its Dravosburg line and build a bridge across the river.

Niagara Falls, Ont.—The Niagara Falls Park & River Electric Railway will, it is said, be extended from Chippewa to Fort Erie, and from Queenstown to Niagara-on-the-Lake. The company may also develop and sell power. It is thought that the road, if operated more nearly in connection with the Gorge Railway on the American side, would be more successful than heretofore.

Philadelphia, Pa.—An extension of the Union Traction Co.'s Chestnut Hill line as far as the Old Wheel Pump Hotel, at the foot of Chestnut Hill and within half a mile of Flourtown, is now in operation, cars running at intervals of six minutes.

Quebec, Que.—The Quebec, Montmorency & Charlevoix Railway Co. has transferred its rights in the electric railway to the new company. Two hundred men will be put on the lower town section to St. Saviour. In connection with the work it is probable that a bridge will be built over the St. Charles River to Parent Park.

Racine, Wis.—The management of the Milwaukee, Racine & Kenosha Electric Railroad have met with a setback. A large force of men has been pushing the line rapidly, and rails have been laid close to South Milwaukee. The line crosses the tracks of the Chicago & Northwestern at Ives and at the four-mile road. Notice was given to the Northwestern company that the rails would be laid October 10. The Northwestern company served an injunction on the electric company, claiming that they were making every effort to prevent grade crossings. It is probable that the electric company will put in an under crossing.

The Racine & Kenosha Electric road has progressed at a rate that promises to find it completed Nov. 1, as declared by the officers of the company. The company's graders entered the village of South Milwaukee Wednesday morning, and the extension from there to Cudahy, about three miles, will be finished within a month.

Tacoma, Wash.—The Tacoma Traction Co. will probably begin active operations in a few days on the extension of its Fern Hill and Payallup electric lines.

Victor, Col.—Work was begun at this place, on October 14, on an electric road to be built between Victor, Gillett and Cripple Creek. This road was promoted and will be built by the Mackey-Ross Co. The engineering firm of Hills & Sharp, who made the preliminary survey for the road through this city, states that the delay was caused in starting the construction work, due to trouble in obtaining a right of way through some of the smaller towns of the camp. The plan for the generation of the current necessary to operate the road will be built in this city, and the offices of the company will also be located here. It is expected that the road will be completed by next spring.

Wilmington, Del.—The new electric line between Wilmington and New Castle, Del., has been practically completed. Rails are all laid and poles erected. Work on the power-house is progressing rapidly, and the machinery is expected to arrive shortly. An officer of the company has recently stated that cars would be running on the new line by Nov. 1.

Woburn, Mass.—The Woburn & Reading Street Railway Co. has petitioned the city government for a franchise to build and equip an electric road from Montvale avenue up Main to New Boston street, thence through Valley, Middle and Washington streets. The contemplated line will furnish a circuit through the center of the city. Its terminus will be Reading.

Worcester, Mass.—The Worcester & Clinton Street Railway Co. has been formed in this city with a capital stock of \$150,000. The incorporators are Charles E. Dresser, Charles E. Hudson, W. S. Reed and H. L. Pierce.

GENERAL RAILROAD NEWS.

Brooklyn Elevated.—Arrangements have been completed by which the Brooklyn Elevated Railroad Company will, on Nov. 1, assume control of the Culver route, the Prospect Park & Coney Island leased line of the Long Island Railroad, which it will operate until next Spring. Some of the engines of the elevated road are being fitted for use on the surface road, and through trains will be run all Winter from the New York and Brooklyn Bridge to Coney Island.

Central of Georgia.—Earnings for August were:

	1896.	1895.	1894.
Gross earn.....	\$392,741	\$394,196	\$390,404
Oper. exp.....	265,381	272,633	262,171
Net earn.....	\$127,360	\$121,563	\$128,233
Net earn, eight months.....	838,886	465,254	.....

Colorado Midland.—The committee representing the first and consolidated mortgage bonds gives the results from the operation of the road during the years ending June 30, as follows:

	1896.	1895.	1894.
Gross earn.....	\$1,906,280	\$1,592,457	\$1,463,255
Oper. exp.....	1,318,213	1,223,519	1,341,589
P. c. of exp.....	70.72	76.83	91.69
Net earn.....	\$588,067	\$368,937	\$121,667
Taxes, rentals, etc.....	145,015	158,612	150,010
Surplus.....	\$443,052	\$210,325 (Def.)	\$34,343

The committee says: "The increase in revenue is mainly due to the free interchange of traffic with connecting lines and to the revival of the mining industry in the

state of Colorado. Of late the earnings were somewhat reduced in consequence of the strike of miners at Leadville.

The physical condition of the road and its equipment has been improved by large expenditures for renewal of ties, enlarging embankments, widening cuts and overhauling and rebuilding rolling stock, all of which outlays were charged to operating expenses. The rolling stock, however, is insufficient for present traffic requirements, and it will be necessary to provide means for the purchase of additional locomotives and cars. The preparation of a plan of reorganization has been postponed, owing to the unfavorable financial conditions. Under the terms of the bondholders' agreement of Jan. 28, 1895, the agreement ceases to be operative on Dec. 31, 1896, unless a detailed plan of reorganization shall have been submitted to and approved by the depositing bondholders before that date. In order to keep the present agreement in force beyond the close of the current year, the consent of the certificate holders to its extension to June 30, 1897, is asked by the committee.

Chicago & South Side Rapid Transit.—In September the daily average of passengers carried was 31,546 as compared with 27,356 for August, and 33,128 for the corresponding month last year. The net earnings of the road for September were \$17,290 and the operating expenses 66 per cent. of the receipts. The cost for each passenger in September was 3.58 cents as compared with 4.1 cents for the month of August.

Kansas City & Southwestern.—Mr. G. A. Wurde-man had been appointed Receiver of the road, known as the Beaumont Branch of the St. Louis & San Francisco, by the United States Court at the instance of the bondholders. The line is still being operated by the St. Louis & San Francisco under a special contract. The reorganization committee of that road invites holders of the first mortgage 6s of the Kansas City & Southwestern to deposit their bonds not later than Oct. 24 with the Mercantile Trust Co., New York, and receive on completion of the reorganization for each \$1,000 bond deposited with all unpaid coupons \$650 new mortgage bonds \$400 second preferred stock and \$600 common stock of the reorganized St. Louis & San Francisco. The foregoing offer has already been accepted by the holders of more than two-thirds of the bonds.

Philadelphia & Reading.—It is judged by those interested in the reorganization of the company that the new company will assume control by Dec. 1, the date of the new fiscal year. The title of the new company will be the Philadelphia & Reading Railroad Company, and its organization will mark an important era in the history of the great corporation, as with its foundation will disappear the old charter, which was one of the most valuable and comprehensive ever granted by the Legislature of Pennsylvania. Application will be made for a new charter under the laws of the Commonwealth, which will bring the company within the provisions of the new constitution and greatly curtail its powers. The most important change, as a result, will be the severance of the coal and iron company from the railroad company. Under the broad provisions of the old Reading charter the company was enabled not only to operate a railroad, but to purchase coal and iron lands, operate the mines, run furnaces and forges and engage in almost any line of business.

Pullman Palace Car Co.—The annual meeting of the stockholders was held Oct. 15, at Chicago, over \$27,000,000 of the capital stock being represented. The Directors and principal officers were re-elected and the usual quarterly dividend of \$2 per share was declared, payable Nov. 16. The financial report for the year ending July 31, 1896, shows the following:

Revenue.		
Earnings of cars.....	\$8,162,460	
Patents.....	9,412	
Rentals, interest, etc. (less loss in Manufacturing department).....	1,072,510	\$9,244,383
Disbursements.		
Operating expenses.....	\$3,730,079	
Proportion of net earnings paid other interests in sleeping car associations controlled by this company.....	847,897	
Repairs of cars in excess of mileage.....	138,938	
Dividends.....	2,880,000	\$7,596,975
Surplus for year, being excess of revenue over ordinary disbursements.....	\$1,647,408	

The total mileage of railroads, covered by contracts for the operation of cars of this company, is 124,352. The number of passengers carried during the year was 5,112,965 and the number of miles run 191,862,947, against 4,788,500 passengers carried and 179,457,071 miles run during the previous year, an increase of about seven per cent.

During the fiscal year, contracts have been made, covering a period of 18 years, continuing the operation of this company's cars upon the lines of the Atchison, Topeka & Santa Fe and of the Southern Railway. There have been built during the year, for the use of the company, 50 cars, costing \$776,903. The number of cars owned and controlled is 2,490, of which 2,230 are standard, and 260 tourist or second-class cars.

The average number of names on the pay rolls at Pullman for the year was 4,508, and wages paid \$2,418,109, making an average of \$536 for each person employed. The average daily earnings of journeymen mechanics at Pullman is now \$2.28. At this time last year it was \$2.24. The total number of persons in the employ of the company in its manufacturing and operating departments was 11,515, and the wages paid during the year, \$5,609,121. The number of employees for the previous year was 10,318, and the wages paid \$5,011,565.

Seaboard Air Line.—The earnings for August were:

	1896.	1895.	Inc.
Gross earn.....	\$293,604	\$244,562	\$49,042
Oper. exp.....	207,326	202,530	4,796
Net earn.....	\$85,778	\$41,632	\$44,146
Net earn, eight months.....	134,266	78,301	55,765

Seaboard & Roanoke.—The final arrangements for the transfer of the controlling interest in the common stock of the railroad company, the parent corporation of the Seaboard Air Line of the New York syndicate headed by Thomas F. Ryan and Samuel Thomas were, it is said, completed this week. Mr. Ryan was in Baltimore much of the week in conference with President Hoffman. It is published apparently on the authority of the principals that no changes in the operating department are proposed.

Union Pacific, Denver & Gulf.—Receiver Trumbull has issued orders to abandon the branch line from Como to King, Col. The Receiver states that neither the freight nor the passenger business warrants the continuance of service on the line. Formerly there were coal mines at King, but these have been closed down.

Electric Railroad News.

Atlantic City, N. J.—The Brigantine Transit Co., which operates an electric line from Brigantine Beach, has issued circulars to its creditors proposing a reorganization. It is proposed to organize a new company which will issue \$50,000 first mortgage bonds to cover the Receivers' certificates and court expenses, and to give the present bond and stockholders full paid first mortgages for an equal amount of their securities, and second preferred stock to the value of overdue coupons.

Baltimore, Md.—A permanent injunction was granted by Judge Dennis in the Circuit Court on Oct. 15, restraining Charles C. McColgan and Sheriff Mason from selling a portion of the roadbed of the Belt Railroad Co. in execution of a judgment of \$3,543 obtained by Mr. McColgan. Sheriff Mason had levied on 25 lots, comprising part of the company's roadbed, and advertised them to be sold on Oct. 21. The injunction prohibits this sale. A suit to restrain the operation of the railroad until the amount of the judgment is paid is pending, and will be heard at the November term of court. With the costs, the judgment now amounts to about \$4,000.

An order signed Oct. 15 by Judge Dennis, in the Circuit Court, requires cause to be shown by Oct. 27 why a receiver shall not be appointed for the Edmondson Avenue, Catonsville & Ellicott City Electric Railway, the Baltimore end of the proposed Boulevard line between Baltimore and Washington. Henry J. Berkley, George C. Schon and Victor G. Bloede filed the bill of complaint. The suit is the result of the appointment of receivers for the Catonsville Construction Co., which had the contract for building the railroad. The bill states that the railroad company has been stripped of its assets, as all its stocks and bonds were transferred to the Catonsville Construction Co. for building the road. No valid contract, it is claimed, has ever been made with the construction company, and the transfer of the railroad company's securities is declared to be illegal and without consideration. Work on the railroad has been stopped, and it is claimed that the appointment of a receiver is necessary either to sell the railroad or complete it.

Buffalo, N. Y.—Some time ago a temporary injunction was granted to John Fleming and James H. Kelly, which restrained the Lewiston & Youngstown Frontier Railway Co. from laying tracks in Water street in Lewistown, N. Y. On Oct. 16, Attorney Frederick Chorman, who represents the plaintiffs, applied to Justice Laughlin in the Special Term of the Supreme Court, for an order making the temporary injunction order permanent. He stated that the railroad company has already laid tracks on the west side of the street, and that it was willing that a permanent injunction should be issued by the Court restraining it from laying tracks on the other side. Mr. Chorman said his clients did not want any tracks in the street at all, and for this reason requested that the injunction be made permanent. Justice Laughlin granted an injunction order restraining the defendant from laying tracks on the west side of the street until the action now pending is settled.

Chicago.—It is reported that J. Pierpont Morgan & Co., of New York, have underwritten \$5,000,000 in bonds of the General Electric Railway; \$3,000,000 of these bonds will be shortly issued for building the 11½ miles of road provided for in the ordinance owned by the railroad company. The remaining \$2,000,000 will be held, to be issued when required for further extension and construction work.

Hartford, Conn.—The suit of the New England Railroad Co. against the Central Railway & Electric Co., of New Britain, the Newington Tramway Co. and the Hartford Street Railway Co., involving the right of the defendants to build a connecting electric line between Hartford and New Britain through Newington, was begun Oct. 16 in the Superior Court before Judge Wheeler. President E. S. Goodrich, of the Hartford Street Railway Co., and Secretary C. S. Landers, of the Central Railway & Electric Co., were examined as to an alleged agreement between their respective roads to build through Newington to New Britain, and to absorb or control the Newington Tramway Co. The suit is to determine whether the proposed electric line to New Britain will parallel the New England road within the meaning of the statute prohibiting unnecessary parallel lines.

New York.—At the annual meeting of the Directors of the Metropolitan Traction Co. held in this city on Oct. 20, R. Somers Hayes and A. H. Paget were re-elected Directors of the first class for the ensuing year.

Oswego, N. Y.—It has been stated that the Oswego Street Railway will shortly be sold, under the first mortgage bonds, which are held by the Knickerbocker Trust Co., of New York. The railroad company has been advanced about \$60,000 by C. Sidney Shepard, of New York, who is expected to buy the road in at the sale.

TRAFFIC.

Traffic Notes.

The Missouri, Kansas & Texas lately took a trainload of lard from Kansas City to Galveston, for export to Germany.

The Seaboard Air Line has given notice that an appeal will be taken from the decision of Judge Speer, forbidding the reduction of freight rates in the fifth district.

The Mallory Line steamships are to call at Port Royal, S. C., to connect with the Charleston & Western Carolina road, as soon as the necessary arrangements can be made.

Scarcity of freight cars is now reported by local newspapers in Minnesota and Kansas as well as in Iowa. On the railroads east of Chicago, while the grain movement is heavy, there seems to be no lack of engines and cars, for the reason that all other kinds of traffic continue extremely dull. The movement of grain from Kansas and other Western states to New Orleans and Galveston, and also to the Republic of Mexico, is now heavy.

In a suit in one of the state courts at St. Louis, Mo., Judge Russell has decided that a bicycle must be carried free, the same as baggage. The release prepared by the Boston & Albany, to be signed by passengers presenting for transportation bicycles to which lanterns and other appurtenances are attached, does not require the owner to renounce all claim to damages, but places the limit at 25 cents for any loss or injury to the removable things.

The United States Grand Jury at Wichita, Kan., has indicted certain shippers of meats for defrauding the

railroads by false description of packages. The reports state that dressed poultry, game and other fresh meat has been shipped as salt meats. Boxes were described as containing "dried chucks," a term which the railroad men seem to have understood as meaning a cheap quality of beef, whereas the shippers understood it to mean dressed chickens, turkeys, etc.

The agreement to advance grain rates from the Missouri River to Chicago, and to Eastern points generally, is noted in our letter from Chicago in this issue. The roads west of the Missouri River have also agreed to readjust the rates on grain from Kansas points to Kansas City and to other points on the Missouri River, so that these, added to the rates from the river to Chicago, shall not be more than one cent per 100 lbs. above the through rates from interior Kansas points to Chicago.

The Managers of the Joint Traffic Association have formally adopted the passenger differentials agreed to by the Transcontinental Association two years ago, thereby approving the present rates over the Canadian Pacific, but with the understanding that the American lines shall agree with the Canadian Pacific as to a division of business. If necessitated by the proposed agreement, the fares over the Canadian Pacific may then be advanced or reduced.

The Managers have also passed a resolution, the effect of which is to forbid any road having its tickets on sale at points off its own line, except where it has leave to do so from the Trunk Line or Central Passenger Committee. If the local committee cannot reach a decision, then a question of this kind may be appealed to the Board of Managers.

Mobile Export Traffic.

Gen. James C. Clarke, President of the Mobile & Ohio, reports an immense increase in the export business of Mobile. He predicts that it will not be a great while before necessity for steamer wharfrage will demand that a tier of wharves be constructed for two miles along the eastern bank of the river. There are now 412 cars of grain standing on the tracks of the Mobile & Ohio waiting to get through the elevator. There is need of another elevator to handle the rapidly increasing business. During July, August and September the Mobile & Ohio hauled into Mobile 49,000 tons of freight for export, and General Clarke says the local yards are so crowded now that he has ordered additional tracks built. On Friday last there were 10 large steamships in the port of Mobile to load for foreign ports.—*Baltimore Sun.*

Chicago Traffic Matters.

CHICAGO, Oct. 21, 1896.

The Atchison, Topeka & Santa Fe has withdrawn the conditions on which it based its objections to the advance of Western freight rates, and it is now confidently asserted that these rates will be restored generally on Nov. 2. The rate on wheat, Kansas City to Chicago, will be advanced to 19 cents and that on corn and other coarse grains to 15 cents per 100 lbs. The proportions on through rates will run about 5 cents less. This is from 5 to 6 cents below the basis in effect prior to July 1 last, but is a material advance over present rates. All other rates except those on coal will be restored to the old basis. The Santa Fe's principal condition was that its allotted percentage of traffic under the old agreement be made up; so it is to be supposed that it has succeeded in getting its principal competitors to agree to some sort of arrangement for equitable distribution of traffic.

The Western roads have agreed to continue the present clergy agreement for another year. The scheme of issuing one permit good over all roads in the Western Passenger Association has worked very satisfactorily. The only objection has come from the ministers, who have made some little complaint at paying 50 cents for their permits. This opposition, however, has been very slight, the majority of the clergy preferring the new arrangement to the old.

The flour rate, St. Paul to New York, will remain at 22½ cents per 100 lbs. for some time, as the Great Northern and its water connection, the Northern Steamship Co., would not make the agreed advance. The old 25-cent rate will undoubtedly be restored immediately after the close of navigation.

The Santa Fe will resume its fast California passenger service, Nov. 4. This year the trains will run only twice a week, leaving Chicago Mondays and Thursdays. The run from Chicago to Los Angeles is scheduled at 72 hours. The Illinois Central will also resume its California service on the same date. It will run sleeping-cars from Chicago to San Francisco via New Orleans. The first-class sleepers will leave Chicago Tuesdays and Saturdays and the second-class or tourist sleepers will start on Wednesdays and Fridays.

The action of the Joint Traffic Association in ordering a suspension of all passenger relations with the Clover Leaf is approved by the officers of the Central Passenger Committee roads.

During the tourist season, from May 15 to Sept. 30, the number of return tickets deposited with the joint agents in Colorado were as follows: At Denver, 4,102; Colorado Springs, 3,192; and Pueblo, 610—a total of 7,904. To this is to be added the return portions of other kinds of special tickets, making a grand total of 9,008.

Total shipments to the East by lake last week were 160,633 tons, of which 150,947 tons were grain. All-rail shipments, exclusive of live stock, footed up 78,905 tons, compared with 51,520 tons for the preceding week, an increase of 27,385 tons, and against 86,023 tons for the corresponding week of last year. The all-rail traffic was proportioned among the roads as follows:

Roads.	WEEK TO OCT. 17.		WEEK TO OCT. 10.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	7,337	9.4	5,460	10.6
Wabash.....	6,805	8.6	3,838	7.5
L. S. & M. S.....	10,047	12.7	5,665	11.0
Pitts., Ft. Wayne & Chicago	5,313	10.6	4,714	9.2
Baltimore & Ohio.....	8,727	11.1	5,472	10.6
Pitts., Cin., Chi. & St. Louis.	5,835	7.5	4,751	9.2
Grand Trunk.....	9,645	12.2	4,969	9.6
N. Y. C. & St. L.....	8,566	10.9	7,438	14.4
Erie.....	9,852	12.5	7,099	13.8
C. C. C. & St. Louis.....	3,578	4.5	2,114	4.1
Totals.....	78,905	100.0	51,520	100.0

Of the above shipments, 3,248 tons were flour, 35,591 tons grain, 17,426 tons provisions, 11,689 tons dressed beef, 2,165 tons butter, 1,454 tons hides and 4,097 tons lumber.